

BOSTON PUBLIC LIBRARY



3 9999 09767 898 9

THE PUBLIC LIBRARY

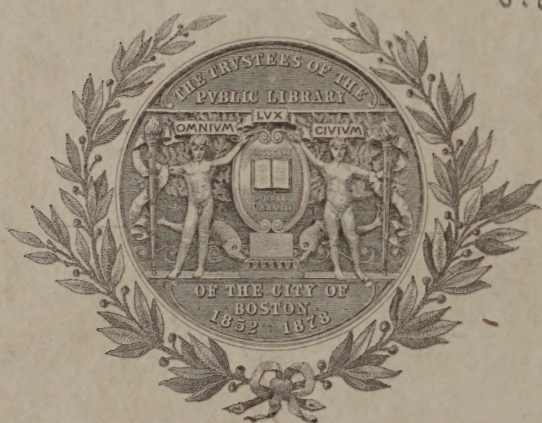
OF THE

CITY OF BOSTON

~~7. 31. 1709~~

No 3845.59

v.2



B. H. Ry. 461.4

A REPORT

ON THE

TREES AND SHRUBS

GROWING NATURALLY IN

THE FORESTS OF MASSACHUSETTS.

ORIGINALLY PUBLISHED AGREEABLY TO AN ORDER OF THE LEGISLATURE BY THE
COMMISSIONERS ON THE ZOOLOGICAL AND BOTANICAL
SURVEY OF THE STATE.

By GEORGE B. EMERSON.

(3)
VOL. II.

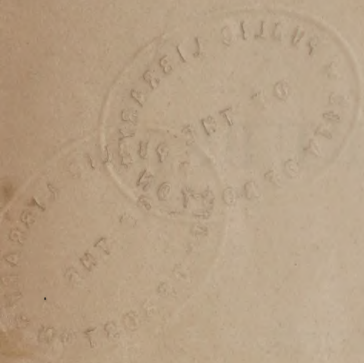
CONTAINING THE ELMS, ASHES, LOCUSTS, MAPLES, LINDENS,
MAGNOLIAS, LIRIODENDRONS, AND MOST
OF THE SHRUBS.

PUBLIC LIBRARY
OF THE
CITY OF BOSTON
BOSTON:

LITTLE, BROWN, AND COMPANY.

1875.

7666



134

185,821

Oct. 2. 1875

Entered according to Act of Congress, in the year 1875, by

GEORGE B. EMERSON,

In the Office of the Librarian of Congress, at Washington.

© 1875

© 1875

© 1875

Cambridge:
Press of John Wilson & Son.

TABLE OF CONTENTS.

VOLUME II.

CHAPTER III. *Plants whose Flowers are without Petals, and not arranged in Aments.*

- FAMILY X. Elm Family, 319. Genus 1. Elm, 320. Insects on, 321. Sp. 1. American Elm, or White Elm, 322. Sp. 2. Slippery Elm, 334. English Elm, 336. Scotch Elm. River Elm, 342. Racemed Elm, 343. Genus 2. Nettle Tree, 343. Sp. 1. American, 344. Sp. 2. Hackberry, 347. Planer tree, 350. Tselkwa tree, 351.
- FAMILY XI. Sandal Wood Family. Genus 1. Tupelo, 352. Sp. 1. Tupelo tree, Snag, Horn Pine, or Pepperidge, 353.
- FAMILY XII. Cinnamon Family, 358. Genus 1. Sp. 1. Sassafras, 359. Insects on, 361. Genus 2. Benzoin. Sp. 1. Fever Bush or Spice Bush, 365.
- FAMILY XIII. Mezereum Family. Genus 1. Dirca. Sp. 1. Leather wood, 367.
- FAMILY XIV. Crowberry Family. Genus 1. Oakesia. Sp. 1. Plymouth Crowberry, 369.

CHAPTER IV. *Monopetalous Plants.*

- FAMILY XV. Olive Family, 371. 1. OLIVE Tribe. Genus 1. Privet. Sp. 1. Common Prim, 372. 2. LILAC Tribe. 3. Ash Tribe. Genus 2. Ash, 374. Sp. 1. White, 376. Sp. 2. Red, 380. Sp. 3. Black, 381. European, 383.
- FAMILY XVI. Holly Family, 384. Genus 1. Holly. Sp. 1. American, 385. Genus 2. Wild Holly. Sp. 1. Mountain, 387. Genus 3. Winter Berry. Sp. 1. Black Alder, 389. Sp. 2. Single Berry Black Alder, 390. Sp. 3. Ink Berry, 391.
- FAMILY XVII. Madder Family. Coffee, 392. Genus 1. Sp. 1. Button Bush, 394. Genus 2. Sp. 1. Partridge Berry, 396.
- FAMILY XVIII. Honeysuckle Family, 398. Genus 1. Linnæa. Sp. 1. Twin-flower, 399. Genus 2. Triosteum, 400. Sp. 1. Fever Root, 401. Genus 3. Lonicera. Sp. 1. Hairy Honeysuckle, 402. Sp. 2. Small-flowered Yellow Honeysuckle, Woodbine, 403. Evergreen Honeysuckle, 404. Japan Honeysuckle. Sp. 3. Fly Honeysuckle. Sp. 4. Hairy Fly Honeysuckle, 405. Genus 4. Diervilla. Sp. 1. Three-flowered Bush Honeysuckle, 406.
- FAMILY XIX. Elder Family, 407. Genus 1. Elder. Sp. 1. Panicked, 408. Sp. 2. Common, 409. Genus 2. Guelder Rose. Viburnum. SECTION 1. Sp. 1. Naked Viburnum, 411. Sp. 2. Sweet, 412. Sp. 3. Arrow Wood, 413. Sp. 4. Maple-leaved Arrow Wood, 414. SECTION 2. Sp. 1. Cranberry tree, 415. Sp. 2. Wayfaring tree, 417.

- FAMILY XX. Heath Family, 419. ANDROMEDA Tribe. Genus 1. *Andromeda*. Sp. 1. Water *Andromeda*, 420. Genus 2. *Cassandra*. Sp. 1. Dwarf, 423. Genus 3. *Lyonia*, 424. Sp. 1. *Panicled*. Genus 4. *Zenobia*, 425. Sp. 1. *Clustered*, 425. Genus 5. *Clethra*. Sp. 1. *Alder-leaved*, 426. Genus 6. *Epigaea*. Sp. 1. *May Flower*, 428. Genus 7. *Gaultheria*. Sp. 1. *Chequer Berry*, 430. Genus 8. *Bear Berry*. Sp. 1. *Common*, 431. RHODORA Tribe. Genus 9. *Rhododendron*. Sp. 1. *American Rose Bay*, 435. SECTION *Azalea*. Sp. 1. *Swamp Pink*, 438. Sp. 2. *Upright Honeysuckle*, 440. RHODORA. Sp. 1. *Canada*, 441. Genus 10. *Kalmia*, 442. Sp. 1. *Mountain Laurel*, 443. Sp. 2. *Narrow-leaved Kalmia*, 445. Sp. 3. *Glauca*, 446. Genus 11. *Ledum*, 447. Sp. 1. *Labrador Tea*, 447.
- FAMILY XXI. Whortleberry Family, 449. Genus 1. *Whortleberry*, 450. Sp. 1. *Black*, 451. Sp. 2. *Dangleberry*, 452. Sp. 3. *Bush Huckleberry*. Sp. 4. *Deerberry*, 453. Sp. 5. *High Bush Whortleberry*, 454. *Black Swamp*. Sp. 6. *Blue*, 455. Sp. 7. *Low Blueberry*, 456. Sp. 8. *Cowberry*, 457. Genus 2. *Cranberry*. Sp. 1. *Common*, 458. Sp. 2. *European*, 459. Genus 3. *Chiogetes*. Sp. 1. *Mountain Partridge Berry*, 460. *Trumpet Flower*, 461.

CHAPTER V. *Plants with the Petals and Stamens growing from the Calyx, except in Cornus.*

- FAMILY XXII. Cornus Family. Genus 1. *Cornel*, 462. SECTION 1. Sp. 1. *Alternate-leaved*, 463. Sp. 2. *Round-leaved*, 464. Sp. 3. *Red-stemmed*. Sp. 4. *Panicled*, 465. Sp. 5. *Silky*, 466. SECTION 2. Sp. 6. *Flowering Dogwood*, 467. SECTION 3. Sp. 7. *Dwarf Cornel*, 469.
- FAMILY XXIII. Witch Hazel Family. Genus 1. *Witch Hazel*, 471. Sp. 1. *Common*, 472.
- FAMILY XXIV. Currant Family, 475. Genus 1. *Ribes*. Sp. 1. *Prickly Gooseberry*. Sp. 2. *Common Wild*, 476. Sp. 3. *Round-leaved*, 477. Sp. 4. *Swamp*. Sp. 5. *Large-flowering currant*, 478. Sp. 6. *Mountain*, 479.
- FAMILY XXV. Cactus Family, 480. Genus 1. *Indian Fig*. Sp. 1. *Prickly Pear*, 481.
- FAMILY XXVI. Rose Family, 483. SPIRÆA Tribe. Genus 1. *Spiræa*. Sp. 1. *Nine Bark*, 484. Sp. 2. *Queen of the Meadows*, 485. Sp. 3. *Steeple*, 486. BRAMBLE Tribe. *Flowering Raspberry*. *Red Raspberry*, 487. *Black Raspberry*. *Blackberry*; *Low Blackberry*. *Thimbleberry*. *Bristly Blackberry*. ROSE Tribe. *Early Wild Rose*; *Swamp*; *Shining*, 488.
- FAMILY XXVII. Apple Family. Genus 1. *Thorn*, 489. Sp. 1. *Cockspur*, 492. Sp. 2. *Scarlet-fruited*, 493. Sp. 3. *Pear-leaved*, 494. Sp. 4. *Dotted-fruited*, 495. Genus 2. *Pear*. *Pear tree*, 496. *Apple*, 498. Sp. 1. *American Mountain Ash*, 499. *Rowan Tree*, 501. Sp. 2. *Choke Berry*, 502. Genus 3. *Wild Sugar Pear*. Sp. 1. *Shad Bush*. Variety 1. *June Berry*, 503. Var. 2. *Swamp Sugar Pear*, 504. *Quince*, 506.
- FAMILY XXVIII. Almond Family, 508. Insects on. Genus 1. *Plum*, 509. Sp. 1. *Beech*, 510. Sp. 2. *Yellow*, 511. *Wild Bullace Tree*, 512. Genus 2. *Cherry*. SECTION 1. Sp. 1. *Northern Red*, 513. Sp. 2. *Sand*. SECTION 2. Sp. 3. *Black*, 515. Sp. 4. *Choke*, 518.
- FAMILY XXIX. Bean Family, 520. Genus 1. *Locust*, 522. Insects on. Sp. 1. *Common Locust*, 523. *Kentucky Coffee Tree*. *Canada Judas Tree*, 529.

TABLE OF CONTENTS.

v

CHAPTER VI. *Plants with many Petals which grow together with the Stamens, about or upon a Disk surrounding the Seed-vessel.*

- FAMILY XXX. The Vine Family. Genus 1. Grape Vine, 530. Sp. 1. Fox Grape, 531. Sp. 2. Summer, 533. Sp. 3. Winter, 534. Sp. 4. River or Sweet-scented. Genus 2. Ampelopsis. Sp. 1. Virginian Creeper, 535.
- FAMILY XXXI. Buckthorn Family. Genus 1. Buckthorn, 538. Sp. 1. Common, 539. Sp. 2. Alder-leaved, 540. Genus 2. Ceanothus. Sp. 1. New Jersey Tea, 541.
- FAMILY XXXII. Staff-tree Family. Genus 1. Bladder-nut, 543. Sp. 1. Three-leaved, 544. Genus 2. Staff-tree. Sp. 1. Waxwork, 545. Horse-Chestnut Tree, 546.
- FAMILY XXXIII. Maple Family. Genus 1. Maple, 548. Large-leaved; Round-leaved; Norway; Field; Montpelier; Guelder-rose-leaved; Italian; Tartarean; Smooth-leaved; Sycamore. Insects, 549. Sp. 1. Red Maple, 551. Colors of the leaves not caused by frost, 553. Causes, 554. Sp. 2. White Maple, 556. Sp. 3. Rock or Sugar, 558. Varieties of the Wood, 561. Making of Sugar, 564. Sp. 4. Striped Maple, 566. Sp. 5. Mountain, 567.

CHAPTER VII. *Polypetalous Plants with Stamens and Petals growing upon the Receptacle.*

- FAMILY XXXIV. Sumach Family, 569. Genus 1. Sumach. Tanner's; Var-nish; Venetian; Smoke Tree, 570. Sp. 1. Stag's Horn, 571. Sp. 2. Smooth, 572. Sp. 3. Mountain or Dwarf, 574. Sp. 4. Poison, 575. Indian Poke a remedy for the poison, 576. Sp. 5. Poison Ivy, 577. Sp. 6. Fragrant Sumach, 579.
- FAMILY XXXV. Prickly Ash Family. Genus 1. Xanthoxylum, 580. Sp. 1. Prickly Ash, 581.
- FAMILY XXXVI. Linden Family. Genus 1. Linden or Lime Tree, 582. Sp. 1. Bass Wood, 584.
- FAMILY XXXVII. Rock Rose Family. Genus 1. Sun Rose, 589. Sp. 1. Can-ada, 590. Genus 2. Pinweed. Sp. 1. Large. Sp. 2. Thyme-leaved, 591. Sp. 3. Small. Genus 3. Hudsonia. Sp. 1. Downy, 592. Sp. 2. Heath-like, 593.
- FAMILY XXXVIII. Barberry Family. Genus 1. Barberry, 594. Sp. 1. Com-mon, 595.
- FAMILY XXXIX. Moonseed Family. Genus 1. Moonseed, 599. Sp. 1. Can-ada, 600.
- FAMILY XL. Magnolia Family, 601. Genus 1. Magnolia, 602. Cucumber Tree; Long-leaved Cucumber; Three-petalled; Heart-leaved; Yulan; Pur-to 602. Sp. 1. Small Magnolia, 603. Genus 2. Liriodendron; Sp. 1. Tulip

SECOND GENERAL DIVISION.

CHAPTER VIII. *Monocotyledonous Plants.*

- FAMILY XLI. Smilax Family, 608. Genus 1. Smilax, 609. Sp. 1. Green Briar. Sp. 2. Carrion Flower, 610.

EXPLANATION OF THE PLATES.

- Page
321. American Elm. *Ulmus Americana*. Amherst and Northampton.
From photographs.
323. American Elm. *Ulmus Americana*. Leaves, flowers, and fruit.
335. Slippery „ „ *fulca*. Leaves and fruit.
337. European „ „ *campestris*. In the forest. Der Wald. Rossmässler, and Willkomm. Artists, A. Krausse and Ad. Neumann.
343. The Nettle Tree. *Celtis occidentalis*. Leaves, flowers, and fruit.
347. „ Hack Berry. „ *crassifolia*. A tree from Lowell, covered with fruit.
353. The Tupelo. *Nyssa multiflora*.
361. „ Sassafras Tree. *Sassafras officinale*. Leaves, flowers, and fruit. Flowers magnified.
365. Fever Bush. *Benzoïn odoriferum*. Leaves and fruit. 1. Opening flowers and leaves. 2. Opening flower magnified. 3. Ripening flowers and young leaves. 4. Matured flowers magnified.
375. The European Ash. *Fraxinus excelsior*. In the forest. Der Wald.
376. A Forest of Ashes in Maine. From Dr. Piper.
377. The White Ash. *Fraxinus acuminata*. Leaf and fruit.
382. „ Black „ *Fraxinus sambucifolia*. Leaf and fruit.
385. „ American Holly. *Ilex opaca*. Leaves, flowers, and fruit.
387. „ Mountain „ *Nemopanthus Canadensis*. Leaves and fruit.
389. „ Black Alder. *Prinos verticillatus*.
396. „ Button Bush. *Cephalanthus occidentalis*. Leaves, flowers, and fruit.
406. The Bush Honeysuckle. *Diercilla trifida*. Leaves, flowers, and ripening fruit.
411. The Naked Viburnum. *Viburnum nudum*. Leaves, flowers, and fruit.
415. The Maple-leaved Arrow Wood. *Viburnum acerifolium*. Leaves and fruit.

- The Arrow Wood. *Viburnum dentatum*. Leaves and fruit.
421. „ Dwarf Cassandra and Clustered Zenobia. *C. Calyculata* and *Zenobia racemosa*.
427. Sweet Pepperbush. *Clethra alnifolia*.
431. Bear berry. *Arctostaphylos uva ursi*.
435. American Rose Bay. *Rhododendron maximum*.
439. The Swamp Pink. *Azalea viscosa*. Leaves, flowers, and fruit.
 „ Upright Honeysuckle. *Azalea multiflora*. Leaves and flowers.
441. „ Canada Rhodora. *Rhodora Canadensis*. „ „ „
 „ Pale Laurel. *Kalmia glauca*. „ „ „
443. „ Mountain Laurel. „ *latifolia*. „ „ „
445. „ Narrow-leaved Laurel. *Kalmia angustifolia*. „ „ „
451. „ Black Huckleberry. *Gaylussacia resinosa*.
 „ Dangleberry. „ *frondosa*. Leaves, flowers, and fruit.
453. The Blue Huckleberry. *Vaccinium virgatum*.
 „ High Bush Huckleberry. „ *corymbosum*. Leaves, flowers, and fruit.
457. The Low Blueberry. *Vaccinium Pennsylvanicum*.
 „ Common Cranberry. *Oxycoccus macrocarpus*. Leaves, flowers, and fruit.
463. The Alternate-leaved Cornel. *Cornus alternifolia*. Leaves, flowers, and fruit.
465. The Round-leaved Cornel. *Cornus circinata*. Leaves and mature fruit.
- The Panicleed Cornel. *Cornus paniculata*.
467. „ Silky „ „ *sericea*. Leaves and fruit.
468. „ Flowering Dogwood. „ *Florida*. „ „ „
473. „ Common Witch-Hazel. *Hamamelis Virginiana*. Leaves, flowers, and fruit.
485. The Meadow Sweet and Steeple Bush. *Spiraea salicifolia* and *tomentosa*. Leaves and flowers.
487. The Flowering Raspberry. *Rubus odoratus*. Leaves and flowers.
488. Sweet Briar and Swamp Rose. *Rubus rubiginosa* and *lucida*. Leaves, flowers, and fruit.
493. The White Thorn. *Crataegus coccinea*. Leaves, flowers, fruit, and thorns.
495. The Pear-leaved Thorn. *Crataegus tomentosa*. Leaves, flowers, fruit, and thorns.
503. The Shad Bush. *Amelanchier Canadensis*. Leaves, flowers, and fruit.

513. The Wild Red Cherry. *Prunus* or *Cerasus Pennsylvanica*. Two varieties. Leaves, flowers, and fruit.
515. The Black Cherry. *Prunus* or *Cerasus serotina*. Leaves, flowers, and fruit.
518. The Choke Cherry. *Prunus* or *Cerasus Virginiana*. Leaves, flowers, and fruit.
523. The Common Locust Tree. *Robinia pseudacacia*. C. A. Johns.
536. „ Virginian Creeper. *Ampelopsis quinquefolia*. Leaves and fruit.
545. „ Climbing Staff Tree. *Celastrus scandens*. „ „ „
547. „ Horse Chestnut Tree. *Aesculus Hippocastanum*. C. A. Johns, „ Forest Trees of Britain.”
549. The Sycamore. Great European Maple. *Acer pseudo-platanus*. Der Wald.
551. The Red Maple. *Acer rubrum*. Leaves, sterile and fertile flowers, and single flowers magnified.
556. The White Maple. *Acer dasycarpum*. Leaves, sterile and fertile flowers.
559. The Rock Maple. *Acer saccharinum*. Leaves, flowers, and fruit.
565. „ Striped „ „ *Pennsylvanicum*. „ „ „ „
568. „ Mountain Maple. *Acer spicatum*. „ „ „ „
571. „ Stag's Horn Sumach. *Rhus typhina*. Leaves and ripening fruit.
573. The Smooth Sumach. *Rhus glabra*.
575. „ Poison „ „ *venenata*. Branch, with a leaf and panicle of male flowers; ripening fruit.
577. The Poison Ivy. *Rhus toxicodendron*. Leaves, fruit, and radicles.
583. „ Lime Tree or Linden. *Tilia Europaea*. Der Wald.
585. „ American Linden. *Tilia Americana*. Leaves, flowers, and fruit.
603. „ Small Magnolia. *Magnolia glauca*. „ „ „ „
605. „ Tulip Tree. *Liriodendron tulipifera*.
610. „ Green Briar. *Smilax rotundifolia*. Stem, leaves, and fruit.

TREES AND SHRUBS

OF

MASSACHUSETTS.

TREES AND SHRUBS

OF

MASSACHUSETTS.

CHAPTER III.

PLANTS WHOSE FLOWERS ARE WITHOUT PETALS, AND NOT ARRANGED
IN AMENTS.

FAMILY X. THE ELM FAMILY. *ULMACEÆ*. MIRBEL.

THE members of this family, several of which, in our own country, are among the noblest and most valuable timber trees, are natives of the northern temperate regions of both continents, being found in North America and Europe, in China, and the other northern countries of Asia, and in the mountains of India. They are allied, botanically, to the Nettle Family on the one hand, and to the Bread-fruit on the other, however different they may be in their general aspect. They are not distinguished by any remarkable properties. The bark of several species is tough and fibrous, and susceptible of being used for rude cordage; the substance which exudes spontaneously from the bark of the elm, and thence called ulmin, is also found in that of the oak and chestnut, and is said by Berzelius to be a constituent of most kinds of bark. The plants belonging to this family are trees with simple, serrate, roughish, unequal-sided leaves, which are usually alternate in two rows on the sides of the branches. The flowers are in fascicles on the sides of the branchlets, and furnished usually with stamens and pistils, but sometimes wanting the latter. The flower-cup is erect, somewhat bell-shaped, with its border divided into four, five, six, or eight lobes. The stamens spring from the bottom of the cup, and

are usually of the same number as the lobes, and opposite them. The ovary has one cell and one ovule, and is crowned with two styles. The fruit is a flattened, winged samara, or a drupe.

There are two genera found in this State, the Elm, *Ulmus*, whose fruit is a samara; and the Nettle Tree, *Celtis*, whose fruit is a stone fruit or drupe. A third genus, *Planera*, is found in the Southern States, and might be cultivated here.

1. THE ELM. *ULMUS*.¹ Linn.

The elms are all long-lived trees, with hard wood, consisting of twisted and interlaced fibres, alternate, deciduous, harsh, serrated leaves, inequilateral at base. The flowers come out, early in the spring, before the leaves, in small, dark-red, fringe-like tufts, and are soon succeeded by the peculiar fruit called a samara, consisting of a small, central, thin membrane, containing a seed, and bordered by a thin, wing-like margin. This becomes mature and falls when the leaves are expanding. The buds are covered with six or seven coriaceous scales, overlying each other in two rows; those which contain flowers are large, and arranged on the sides of the branchlets of the preceding year. The leaves have short stalks, are rough, unequally and doubly serrate, acuminate, and vary much in size and shape. So are the membranaceous stipules, a pair of which embrace each leaf within the bud, and at the same time protect the leaves which are to succeed from the same bud. The roots of most of the species are strong, very tough, supple, and spreading extensively beneath the surface. When raised from seed, the different species have a striking tendency to vary; and in Europe, where, for its uses in agriculture and the mechanic arts, and for ornament and shade, it has been constantly cultivated since the time of the Romans, the varie-

¹ The Latin word *Ulmus* is supposed to be derived from the Saxon word elm or ulm, which is given as the name of this tree in almost every Saxon dialect.



AMERICAN ELM,
ANHERST.

AMERICAN ELM. *Ulmus Americana.*



AMERICAN ELM,
NORTHAMPTON.

ties are very numerous. The same tendency may be observed, in the variation of shape and habit, in the native elms of different parts of New England, and even of Massachusetts.

Their growth is rapid; they bear transplanting and pruning better than almost any other tree; they grow on almost any soil, and have a great variety of beauty; and their timber is valuable for many purposes, and bears continual exposure to moisture without decay. Perhaps, therefore, no trees are greater favorites, or more deservedly so. On the continent of Europe, where the variety of forest timber trees is much smaller than in America, the elm is applied to a great number of uses, for which other trees are here preferred, as the wood has the disadvantage of being liable to warp and shrink, unless very long and thoroughly seasoned, or kept moist. Both living and dead, it is liable to the attacks of insects and worms, which strip it of its foliage, penetrate into its bark and wood, and lessen the value of its timber.

A great many insects feed upon its leaves. The most pernicious, if not the most universal of these, are the canker-worms (*Anisopteryx vernata* and *pometaria*), one or two species of which, with their habits, times and mode of destruction, have been carefully described by Dr. Harris (Report, p. 461-463). Less injurious are the span-worms, called, when arrived at their perfect moth state, *Hybernia tiliaria*, the Lime-tree winter-moth (ib. p. 473). The *Cimbex ulmi*, a species of saw-fly (ib. pp. 518, 519), feeds on the leaves of the elm, during its caterpillar existence; and the caterpillars of some of the most beautiful of the moths and butterflies, such as the stinging caterpillars of the *Saturnia* moth (ib. p. 393), the caterpillars of the *Antiopa* butterfly (ib. p. 296), of the Semicolon butterfly, *Vanessa interrogationis* (ib. p. 298), of the Progne butterfly, *Vanessa progne* (ib. p. 301), and the enormous caterpillars of the *Ceratonia quadricornis*, which are sometimes three inches and a half long (ib. p. 323),—are all found on this tree, and do more or less harm by devouring its leaves.

There are two species of elm common in Massachusetts, — the American, and the Slippery Elm; another is sometimes found indigenous; and two varieties of the European Elm have been introduced.

Sp. 1. THE AMERICAN ELM. WHITE ELM. *Ulmus Americana*. L.

The American elm is, in most parts of the State, the most magnificent tree to be seen. From a root which, in old trees, spreads much, above the surface of the ground, the trunk rises to a considerable height in a single stem. Here it usually divides into two or three principal branches which go off by a gradual and easy curve. These stretch upwards and outwards with an airy sweep, — become horizontal, the extreme branchlets, and, in ancient trees, the extreme half of the limb, pendent, forming a light and regular arch. This graceful curvature, and the absence of all abruptness, in the primary limbs and forks, and all the subsequent divisions, are entirely characteristic of the tree, and enable an observer to distinguish it in the winter, and even by night, when standing in relief against the sky, as far as it can be distinctly seen.

The American elm affects many different shapes, and all of them beautiful. Of these, three are most striking and distinct. The tall Etruscan vase is formed by four or five limbs, separating at twenty or thirty feet from the ground, going up, with a gradual divergency, to sixty or seventy, and then bending rapidly outward, forming a flat top with a pendent border. Such is the fine old tree, still in perfect vigor, which stands by the painted gate of the Botanic Garden, in Cambridge. And such are many of the noble trees in Northampton and Springfield, and all along the valley of the Connecticut.

The single or compound plume is represented by trees stretching up in a single stem, or two or three parallel limbs, to the height of seventy or even a hundred feet, and spread-



AMERICAN ELM. (*Ulmus Americana.*)

ing out in one or two light, feathery plumes. Of this character was the tall, patriarchal tree that stood alone on the common in Pittsfield. Many specimens of this form may be seen in Berkshire, and in other parts of the State where the tall primeval forest has been cut away, and the elm alone has been left standing.

Our elm often, like the European, assumes a character akin to that of the oak ; this is when it has been transplanted young from an open situation, and allowed always to remain by itself. It is then a broad, round-headed tree. Of this kind are the large tree on Boston Common, the grand old tree which stood by the Aspinwall house in Brookline, and that striking tree, in Hingham, on the road to Cohasset. The resemblance to the oak, however, never very striking, is entirely lost as you approach and stand under it. The mighty, abrupt strength of the oak is not visible ; and you have, instead, the graceful majesty of the elm. "The buttonwood," says Michaux, "astonishes the eye by the size of its trunk and the amplitude of its head ; but the white elm has a more majestic appearance, which is owing to its great elevation, to the disposition of its principal limbs, and to the extreme elegance of its summit. In Maine, between Portsmouth and Portland, a great number of young white elms are seen detached in the middle of the pastures ; they ramify at the height of eight, ten, or twelve feet ; and their limbs, springing at the same point, rise with a uniform inclination, so as to form of the summit a sheaf of regular proportions and admirable beauty."

The character of the trunk is almost as various as that of the general form of the tree. You sometimes see it a straight, gradually tapering column, shooting up to sixty or eighty feet without a limb ; again you see it a verdant pillar of foliage, feathering from the branches to the ground.

With this endless variety of beauty, it is not wonderful that the American elm should be the greatest favorite with the New England people. And it has the additional recommen-

dation of retaining much of its beauty when the foliage is gone. The sturdy trunk and the airy sweep of the branches are always there ; and few objects of the kind are more beautiful than the feathered, alternate regularity of the spray upon the outmost and uppermost boughs. With the earliest spring, these are fringed with numerous bunches of red blossoms, soon to give place to the soft, delicious green of the young leaves.

Coming with such recommendations, the elm is more frequently transplanted than any other forest tree ; and, from the vigor and number of its roots, it is more sure than any other to live. It is oftener spared, too, in most parts of the country, when the rest of the forest is cut away. We frequently, therefore, see it standing, for a shade to cattle, in pastures, and by fences, and sometimes in mid fields, on tilled land, or left to shade and protect and give an air of comfort to farm-houses. And, in the excellent practice, becoming every year more common, of ornamenting towns and villages and sheltering sunny roads with rows of trees, the elm is chosen often to the exclusion of all other trees, — of trees, too, which, much as we value the elm, we cannot but consider its equals and often its superiors, — the maples, the ashes, the birches, the beeches, and even of the lordly oak itself.

But the elm bears pruning better, and requires it less, than almost any tree ; for it usually throws out no branches below a height of twelve to twenty or thirty feet. It grows, too, with great rapidity ; for its roots run, just beneath the surface, to a great distance, and thus get the best of the soil.

The flowers are in numerous clusters of from eight to twenty in a cluster, on the sides of the terminal branches. Each flower is supported on a green, slender, membranous thread, from one fifth to half an inch long ; and consists of a brown cup, parted into seven or eight divisions, rounded at the border, and containing about eight brown stamens, and a long, compressed ovary, surmounted by two short styles.

This ripens into a flattened seed-vessel, called a samara, which is winged on every side, with a thin, ciliated, or fringed border. The flowers appear early in April, or even in March, and the samaræ are mature before the full expansion of the leaves.

The leaves are on very short footstalks, broad ovate, heart-shaped, rounded or rarely acute at base, acuminate, conspicuously doubly serrate; divided by the mid-rib into very unequal parts, of which the upper is larger; somewhat tomentose when young, afterwards roughish on both surfaces, particularly the upper; usually from two to four or five inches long, and one and a half to two and a half broad, but varying extremely in size. The rich green of the leaves turns, in autumn, to a sober brown, which is sometimes touched with a bright golden yellow.

The elder Michaux found the elm as far north, in Canada, as $48^{\circ} 20'$. According to Hooker, it is found from Saskatchewan to York Factory, on Hudson's Bay. The younger Michaux traced it from Nova Scotia to Georgia, and says that it is found in the extreme western part of the country. He considers the country between the 42° and 46° of latitude as most favorable to its growth. To this, probably, no part, considering the soil, is better adapted than Massachusetts. This tree grows in almost any soil; but never attains its loftiest elevation except in rich, moist ground, such as is found on the banks of our larger rivers. In such situations, it has so rapid a growth that he who has planted it may live, without passing beyond the ordinary age of man, to see it become a majestic tree. I once heard an old man, standing in the shade of a tree nearly two feet in diameter, which towered above all around it, say, "This tree, after I had been many years successful in business, and, in a change of fortune, had retired to this farm with a little that remained, I stuck into the ground after I had used it as a stick, in a ride of eight miles home from P——." I know several fine rows of stately elms, the ornaments of the villages where they grow, that were transplanted within the distinct memory of persons now living to enjoy their shade.

From its having been so long a favorite, it has been more frequently spared and oftener transplanted than any other tree; and there are, in all parts of the State, many fine old trees standing. Of a few of those, which I have had an opportunity to examine and measure, or of which I have received an account, I give some of the dimensions.

In Springfield, in a field a few rods north of the hotel, is an elm which was twenty-five feet and nine inches in circumference, at three feet from the ground, when I measured it in 1837. This magnificent tree divides, not many feet from the ground, into several large branches. This is near the place where the enormous *Celtis*, which was usually taken for an elm, once stood. There are many other elms, not far from this, some of which make a greater show at a distance.

In West Springfield, the largest tree I could see upon the road measured, at the same time, nineteen feet five inches in girth at four feet from the ground.

The Pittsfield elm was, in 1837, thirteen feet in circuit at four feet. This towered up to one hundred and fourteen feet, without a branch, till near the top.

The Aspinwall elm, in Brookline, standing near the ancient house belonging to that family, and which was known to be one hundred and eighty-one years old in 1837, then measured twenty-six feet five inches at the ground, or as near to it as the roots would allow us to measure, and sixteen feet eight inches at five feet. The branches extended one hundred and four feet from south-east to north-west, and ninety-five from north-east to south-west. Of this tree, in 1873, only the stump remains.

The great elm on Boston Common was measured by Prof. Gray and myself, in June of 1844. At the ground, it measures twenty-three feet six inches; at three feet, seventeen feet eleven inches; and at five feet, sixteen feet and one inch. The largest branch, towards the south-east, stretches fifty-one feet.

The classical elm, opposite the gate of the Botanic Garden, Cambridge, measured fourteen feet nine inches, at four feet, in 1838.

In Hingham, on the road leading to Cohasset, just below the turn from the Old Colony House, stands an elm which is said to have been transplanted in 1729. It may have been one hundred and twenty or one hundred and twenty-five years old, on the 25th of July, in 1839, when I measured it, in company with that excellent botanist, William Oakes, Esq., of Ipswich. It was thirteen feet in circumference, at four and a half feet from the ground. At from ten to fifteen feet, eight large branches are thrown out, which sweep upwards in a broad curve, making a noble round head sixty or seventy feet high. The immense roots, which, beginning at three or four feet above the surface, stand out like abutments, in all directions, chiefly west and east, give an idea of permanency and vast strength. The extreme spread of the limbs is forty-five feet from the trunk, making the breadth of the head more than ninety feet. In the angle of one of the branches, when we measured it, was growing a currant-bush, with ripe fruit. Speaking of this tree, J. S. Lewis, Esq., to whom I am indebted for valuable information concerning the trees of Hingham, says, "At ten feet, it is fifteen feet nine inches in circumference. It has a hemispherical top, of ninety feet diameter at the base, ascending and terminating with singular uniformity, presenting to the eye a rare combination of beauty and grandeur. At this measurement, it is covered with a deep, luxuriant foliage, looking as fresh and vigorous as a stripling of the forest."

In July of 1838, I measured the noble elm which stands in front of the dwelling-house of Captain Jaquish, about one mile from the centre of Newburyport. This was set out in 1713, by Richard Jaquish, who was born in 1683. It may therefore, be one hundred and thirty-five or one hundred and forty years old. At the smallest place, between the roots and the branches,

it was fifteen feet in circumference, and probably over eighty feet high. It had many large branches, one of which was more than three feet in diameter.

Mr. William Bacon, of Natick, mentions two remarkable elms growing in that town. "One of them is not far from the Old Hartford road, near South Natick Mills. Its pendent branches are spread equally in all directions, to the distance of fifty feet from the trunk, thus giving a diameter to its shade of about one hundred feet. It is the handsomest specimen of its genus which I ever saw. The other is standing upon the south side of the road which leads from Natick to Wayland, near the house of Mr. Edward Hammond. This tree was transplanted to its present situation about sixty years since, under the superintendence of the gentleman who still occupies the mansion. It now (1838) measures thirteen feet in circumference four feet above the ground, and probably twenty or more at the surface. Its shade measures, from north to south, at noon-day, one hundred and two feet. It ramifies at the height of about eight or nine feet."

The great Sheffield elm had, in September, 1844, at the ground, a girth of twenty-two feet six inches; at two feet, eighteen feet six inches; at three, sixteen feet nine inches; at six, sixteen feet seven inches, above which it rapidly enlarges, and divides at ten or twelve feet into three large limbs, which soon subdivide. Its spread westward, from the centre, is forty-nine feet six inches, and it is nearly equal on every side; height sixty or seventy feet.

At Johnston, R. I., on the estate of Royal Potter, Esq., is a magnificent elm, which I measured, August 21, 1840, with the aid of Hon. Horace Mann. At from twelve to fifteen feet, it throws up a prodigious weight of branches, twelve, each equal to a tree,—forming a broad, one-sided head. At five feet from the ground, which is the smallest place, its girth is twenty-two feet two inches; at seven, it is twenty-two feet nine inches; at one and a half on one side, three on the other,

twenty-nine feet nine inches ; at three, twenty-four feet nine inches. Below, one and a half or three, the roots bulge out. The first large branch, which has a girth of eleven feet two inches, divides into two. The second, thirteen feet ten inches in girth, divides into five branches. The horizontal extent of the south-east branch, is sixty-nine feet one inch. It is a very old tree and falling into decay, but still vigorous, and clothed with a rich, dark-colored foliage. Its uncommon growth is, doubtless, owing to its peculiar situation. A small perennial stream flows near it, and its most vigorous limbs are stretched so as to overshadow, for many feet, the little fertile glade through which it flows. It is also near a farmer's yard, the animals belonging to which are often standing by day, or lying by night, under the covert of its branches. It has, to visitors, the additional recommendation of being on the farm of a worthy magistrate, who knows how to respect the curiosity of those who visit it.

Some of these trees are still in apparent vigor, though nearly two hundred years old. It is found, however, on cutting down old elms, that they are, almost universally, hollow at base. Whether this is the case in the rich, deep soils of the western valleys, I know not. In the scanty soils of Massachusetts, it may proceed from the fact, that all the nutriment near the bottom of the tree, where the roots are fed that nourish the heart, is exhausted.

Besides its use as a shade and ornamental tree, its timber is employed for several important purposes in the arts. Its wood is preferred to any native wood for hubs of wheels. In Boston and the vicinity, the hubs for the very superior gigs, light wagons, and other pleasure carriages which are manufactured there, are almost universally made of it. For this purpose, it is obtained from the towns within a few miles in the neighborhood. The same use is made of it in the centre and western parts of the State. Yokes are made of it. In the seaport towns, it is much used for making large ships' blocks. As it

is very difficult to work, these are not made, like the smaller ones which are of ash, of a single thick piece, but of several pieces of plank pinned together. From the peculiarity of the grain, these cannot be planed lengthwise, but must be wrought crosswise. By the ship-builder, it is used in the flat of ships' floors. For blocks and hubs, it is said, by those who have tried both, that English elm is decidedly superior.

Formerly, the bark of the elm was used to make chair bottoms. It has considerable tenacity, and when macerated in water and rendered supple by pounding, may be twisted into a pretty strong cord.

The elm may be very easily propagated by seed, by suckers, or by layers. The seed is ripe in May or early in June; and in August and September, I have seen thousands of young elms springing from them in the paths or sandy walks beneath, or near the tree. The seed should be sown immediately after it has fallen, on soft, sandy loam, and covered lightly to the depth of one eighth or one fourth of an inch. The plants will appear in a few weeks, and may be transplanted to a nursery the same autumn. In from five to ten years, they will be large enough to be planted where they are permanently to stand. There is so great a similarity in the habits of this and the English elm, that it might doubtless be propagated by suckers and layers, in the same manner as directed for that tree.— See pp. 340, 341.

The elm is transplanted from the forest, of every size, from five or six feet to thirty or more; and it is so tenacious of life that it bears beheading and dismemberment in an astonishing manner. Far more pains in the transplantation would be well rewarded. By a little attention to the habit of the young trees, those might be selected which would push up to an ample height before ramifying: and those numerous varieties which strike us by their beauty, when seen standing as they were left on the clearing up of the woods, might be secured

by examining the tendencies of the trees in particular situations.

I have measurements of very many large elms from various parts of this State. For many of them, I am indebted to the kindness of Dr. O. W. Holmes and J. J. Dixwell, Esq. Others I have obtained from other individuals and from the "New England Farmer," and a still greater number I have measured myself. In the following statistics, the words "circumference," "feet," "inches," and "from the ground," will be generally omitted:—

Three miles from Hingham, a fine tall elm measured, in June, 1840, 12 feet 7 inches at $4\frac{1}{2}$ feet. It is of the Etruscan vase shape, and a fine specimen. In the same year, an old elm at Heard's Island, in Wayland, was 20 feet at $1\frac{1}{2}$, and 15 feet 5, at $3\frac{1}{2}$. A very noble tree, 75 feet high, and with a spread of 128 feet from north-east to south-west, and not much less in any direction, covering a broad space with its dense shade. One in Lincoln, a beautifully irregular and picturesque tree, with a full, broad head, growing on the road-side, and giving a cheerful aspect to two houses, and on which a family of orioles had built their hanging nests for not less than seventeen years, — was 12 feet 9, at 5 feet. A broad, spreading tree on the Old Common in Lancaster, was 14 feet 6, at 5 feet 6. East of Centre Bridge, in the same town, on the south side of the river, by a green lane which was once a town road, a tree of 70 or 80 feet high, measured 20 feet 9, at 2 feet above the bulging of the roots. An elm near Breck's garden, one half in a wall, was 16 feet 3, at $5\frac{1}{2}$. It enlarges above and divides into many branches, spreading into a vase-like shape, with a broad, magnificent head of 80 or 90 feet in height. Several other very noble trees are near by. Dr. Gray tells me that an elm near the Botanic Garden which, in 1844, measured, at 6 feet from the ground, 13 feet, is now 14 feet 5 inches; and one which was 14 feet 3 inches is now 15 feet 5 inches.

The following were measured by Dr. Holmes, in September, 1837:—

Great elm, at Springfield, was 29 feet 4, at about one foot; 25 feet 10, at 2 or 3; 24 feet 8, at 5. A curious tree, also in Springfield, was 20 feet 1, at 1; 18 feet 5, where smallest; 22 feet 11, at 5. One on Northampton meadow, was 22 feet 2, at 1; 22 feet, at 3; 23 feet 9, at 5. A second was, 19 feet 7, at 1; 16 feet 6, at 5. One in Mr. Whitney's yard, in that town, was 22 feet 2, at 1; 18 feet 7, at 5. One on Deerfield Street was 17 feet 7, at 5; another, on the Colman farm, 23 feet 9, at 1; 16 feet 7, at 5. A tree at Hatfield, measured 35 feet 9, at a little above 1; 23 feet 2, at 5; 22

feet 7, at $6\frac{1}{2}$. The elm on the Common, at Pittsfield, was 17 feet 4, at 1; and 12 feet 7, at 5. One on the Wendell farm, 20 feet at 1; 13 feet 4, at 5. Thaddeus Morse, at Medfield, had a tree which measured 37 feet 4, probably at the ground.

The following elm trees, in Northampton, were measured by Mr. Dixwell, in November, 1841 : —

On the intervalle between the town and river in "Middle Meadow," an old elm, within sight of the ferry-landing, from Mount Holyoke towards the south-west, 6 inches from the ground, 24 feet 6 in circumference; at $3\frac{1}{2}$ feet, smallest place, 22 feet 10; at $4\frac{1}{2}$ feet, 23 feet 10. It begins to branch at $5\frac{1}{2}$ feet from the ground, and divides into distinct trunks at $7\frac{1}{2}$ feet. Its roots spread very little at the surface. The trunk seems sound outside, but the branches at and just above the main trunk exhibit considerable decay, and one branch, about a foot in diameter, has fallen this season. Spread of branches 110 feet. An elm, with top in fine preservation, and apparently healthy, but with a deep hollow in one side of the trunk, — at the ground, 20 feet 9; at $4\frac{1}{2}$ feet, 16 feet 10, smallest place; branches off at 8 feet from the ground. One in the intervalle in fine condition: at 1 foot from the ground, 21 feet 4; at 2 feet, 17 feet 7, smallest place; at $4\frac{1}{2}$ feet, 19 feet 11; branches at 5 feet from ground, and spreads over an area thirty paces in diameter. A tree, called "Mather Elm," before an old house, formerly occupied by a family of that name, on the north side of Pleasant Street: at 1 foot from the ground, 22 feet 8, roots spread much; at $4\frac{1}{2}$ feet, 15 feet 7, in smallest place; branches at 12 feet, and is in fine condition, with the exception of one large branch gone. Elm, in King Street, planted by President Edwards, now before the house of J. D. Whitney: at the ground, 22 feet 5; at 4 feet above, 18 feet 10, smallest place; branches at 7 feet, and is in fine condition. One in the Main Street, before the house of a Mr. Pomeroy, and opposite the mansion of the late Governor Strong: at 4 feet from the ground, 15 feet 1, smallest part.

Great Elm, at Hatfield, near the church, in the enclosure at the side of the town house: at the ground, 41 feet, roots spread much; at $3\frac{1}{2}$ feet, 27 feet; at 6 feet above, 22 feet 9, smallest place. Branches spread over an area 108 feet in diameter. Two elms, at Hatfield, on the main road in the village, both in very sound and fine condition: the first, at the ground, 25 feet; at 2 feet above, 17 feet 2; at 3 feet above, 15 feet 5, smallest part. The second, at the ground, 20 feet 7; at 2 feet above, 15 feet 5; at $3\frac{1}{2}$ feet above, 13 feet 7, smallest part.

An elm tree, nearly opposite the house of Heman Day, Esq., in West Springfield, was planted by him on the 8th of January, 1775. At the time of transplanting, it was a sapling carried in the hand. The trunk, in 1829, was 18 feet in circumference to the height of 12 feet above the surface, where it divides into branches which overhang a circle of more than 300

feet in circumference, covering 7,500 square feet of surface.—*N. E. Farmer*, VII., 299.

It had thus grown 216 inches in circumference in 54 years, or at a rate of 4 inches a year. All the circles of growth must average two-thirds of an inch. In 1845, this tree was carefully measured by a gentleman of Springfield, who gives me the following dimensions: at 3 feet, its diameter is 7 feet; at 5, 6 feet 5.7; at 8, 8 feet; at 11, 7 feet 4.7 inches. The spread of the top is 134 feet 8 inches. In Lancaster, there is now, 1874, a magnificent elm, standing by itself on the rich intervale land near the lower bridge over the Nashua River on the west side. It has the appearance of three or four large trees grown completely together. It rises grandly to a great height, throwing out most graceful limbs on every side, and making the show of a really noble elm, as seen from any distance on any side. It measures 22 feet 6 inches at its smallest circuit, 3 feet from the surface. Below this it spreads on every side, giving the appearance of vast strength.

The great elm, on Boston Common, measured, in 1820, 23 feet at the ground; and 20 feet at 3. In 1844, it measured, near the ground, 23 feet 6; at 3 feet, 17 feet 11; at 5 feet, 16 feet 1. On a map of Boston, published in 1720, this elm is delineated as a large tree. It is said to have been planted about the year 1670, by Captain Daniel Henchman, an ancestor of Governor Hancock. It is therefore, more than 175 years old.¹

The "Washington Elm," in Cambridge, so called because beneath its shade or near it General Washington is said to have first drawn his sword, on taking command of the American army, measured, in 1842, 15 feet 2, at 1 foot, and 13 feet 2, at 3 from the ground. In 1844, it measured, 13 feet 2½ inches, at the same point, where the girth is smallest. The celebrated Whitefield preached under the shade of this tree in 1744.

The following measurements and accompanying particulars are taken from a communication in the "*New England Farmer*," Vol. IV., p. 242, made in 1826:—

Two elms were set out by the Indians, in front of the house of Rev. Oliver Peabody, who succeeded, in 1722, to the venerable Eliot, the Indian apostle, in the same truly Christian ministry, in Natick. This voluntary offering of the grateful savages, they called *trees of peace*. A similar offering was made to Mr. Peabody's successor, Rev. Stephen Badger. These latter trees were standing, in 1826, having been planted 73 years. They measured 15 feet at the ground, and 9 at the smallest place above, having grown half an inch in diameter annually. A tree standing in Framingham, which was 90 years old, measured, in the same year, 20 feet at 1 foot from the ground. This indicates an annual growth in diameter of

¹ See an article in the *North American Review*, July, 1844, for much curious information on the longevity of trees.

more than four-fifths of an inch. The same communication states that the Charter Oak, in Hartford, Conn., measured, at the ground, 36 feet in girth, and at the smallest place above, 25 feet.¹

Sp. 2. THE SLIPPERY ELM. *Ulmus fulva*. Michaux.

Figured in Michaux, Sylva, Plate 128.

The slippery elm has a strong resemblance to the common elm. It has less of a drooping appearance, and the bark of the smaller branches is rougher, and of a lighter color; on the trunk it is somewhat smoother and darker. It is commonly a much smaller tree. The leaves are thicker and rougher, — excessively rough above. The recent shoots are light gray, and very rough; the older branchlets grayish, or grayish purple. The leaves are on short, stout, hairy and rough footstalks, very large, from four to seven inches long, and three or four wide; heart-shaped and very unequal-sided at base, the upper side being full and spreading back over the footstalk; the termination a long slender point; the margin coarsely and doubly, rather obtusely, serrate; both surfaces very rough, the lower less so, but hairy on the veins and nerves, which are prominent, parallel, straight, and usually divided towards the edge. The upper surface is a pale green, the lower much whiter, reticulate; serratures less falcate than in the common elm. The surface of the latter is rough in one direction, and smooth in the other; of the slippery, rough in both. The buds are large, roundish, and covered with reddish brown hairs, giving the tree a reddish tint in the spring; whence, probably, the name of red elm. The larger branches are brownish, somewhat striate, the bark cracking and becoming ragged at an earlier age than in most trees. On the young and vigorous branches the leaves are often eight or ten inches long, by four

¹ Minot Pratt, of Concord, measured for me, October, 1874, a tree in front of his house, and found it, at 1 foot from the ground, 21 feet 8 inches; at 10, 16 feet 11, just below the branches, which are 10 feet 5; 9 feet 1; 10 feet 4; and 7 feet 6. The tree is 100 feet high.



SLIPPERY ELM. (*Ulmus fulva.*)

or five broad, and of an oblong shape. The bark is tough and mucilaginous, with abundant mucilage beneath it. The flowers are in lateral clusters, on short footstalks. The flower-cup is usually divided into seven parts, and has seven long stamens with dark purple anthers. The ovary is compressed, surmounted by two purple, glandular styles. The seed vessel, or samara, is larger than that of the common elm, and with a broader and more entire border.

The slippery elm is rare in the eastern part of the State. I have not found it, growing naturally, nearer to Boston than Natick. It is found in considerable numbers in South Weymouth, on the rocky borders of a small rivulet.¹ In the western counties, it is more abundant. In many places I have found it dead or dying, from having been stripped of its bark. The largest tree of this kind which I have measured was six feet ten inches in circumference, at four feet from the ground. It was found growing in Natick. Contrary to the observation of Michaux, I have found this tree growing in rich low ground, much more frequently than on higher.

The inner bark of this elm contains a great quantity of mucilage, and is a favorite popular prescription, in many parts of the country, for dysentery, and in affections of the chest.

It is much to be regretted that the slippery elm has become so rare. The inner bark is one of the best applications known for affections of the throat and lungs. Flour prepared from the bark by drying perfectly and grinding, and mixed with milk, like arrow-root, is a wholesome and nutritious food for infants and invalids.

Dr. Darlington says that, in the last war with Great Britain, the soldiers on the Canada frontier found this, in times of scarcity of foliage, a grateful and nutritious food for their horses.

Michaux considers the wood of the slippery elm as superior to that of the white. He says, "The heart is coarser-grained,

¹ Minot Pratt, Concord.

and less compact than that of the white elm, and of a dull red tinge. I have remarked that the wood, even in branches of one or two inches in diameter, consists principally of perfect wood. This species is stronger, and more durable when exposed to the weather, and of a better quality than the white elm; hence, in the Western States, it is employed with greater advantage in the construction of houses; and sometimes of vessels, on the banks of the Ohio. It is the best wood of the United States for blocks, and its scarceness in the Atlantic States, is the only cause of its limited consumption in the ports. It makes excellent rails, which are of long duration, and are formed with little labor, as the trunk divides itself easily and regularly: this is probably the reason that it is never employed for the naves of wheels." — *Michaux*, Vol. III., p. 90.

I find, however, that it is used for the purpose of making hubs in some places in the western part of the State, and is preferred to the white elm. It is so rare in the eastern part of the State, that I have not been able to find any one in this quarter acquainted with its properties.

Michaux found this elm in all parts of Canada and of the United States, except the maritime parts of Carolina and Georgia.

Sp. 3. THE ENGLISH ELM. COMMON EUROPEAN ELM. *Ulmus campestris*. Linn. *Introduced*.

In Boston, and some towns in the immediate vicinity, many of the finest elms are of this species. They are said to have been first imported and planted by a wheelwright, for his own use in making hubs for wheels, for which purpose they are probably superior to any other wood known. They have come, however, to be far too valuable, as trees of ornament, to be often cut down for use. The English elm is a noble tree. If it has less grace than the American, it has more stateliness and grandeur. It has more of the strength of the



EUROPEAN ELM. *Ulmus campestris.*

oak. It is distinguished from the American elm by its bark, which is darker and much more broken; by having one principal stem which soars upwards to a great height, and by its branches, which are thrown out more boldly and abruptly, and at a larger angle. Its limbs stretch out horizontally, or tend upwards, with an appearance of strength, to the very extremity. In the American, they are almost universally drooping at the end. Its leaves are closer, smaller, more numerous, and of a darker color. It has been objected to this elm by Gilpin (*Forest Scenery*, I., p. 90), that it wants a definite character, that it has often so great a resemblance to an oak that it may, at a distance, be mistaken for it. The observation is undoubtedly well founded; but to one who would gladly have the satisfaction of looking on the king of trees, but cannot wait for its tardy growth, it is very far from an objection. The American elm is so planted everywhere, that it is possible to be weary of seeing it; in which case, as a variety, the sight of a stately English elm is a relief. It has, moreover, the advantage of being clothed in an unchanged foliage, *several weeks* longer than our native tree.

The English elm continues to increase for one hundred or one hundred and fifty years, and probably much longer; although, compared with the oak, it is not a long-lived tree, the very old ones being usually hollow at the base. For several centuries it has been planted for ornament, on avenues and public walks in France, Spain, and the Low Countries, and in England, immemorially. When full grown, it is four or five feet in diameter, and sixty or seventy feet high. Raised from seed, it forms innumerable varieties, distinguished by their difference in habit and appearance, time of leaf and peculiarity of hue, and by the qualities of the wood. These varieties, some of them very valuable, are propagated by shoots, and by grafting. Like the American elm, it is of very rapid growth. Evelyn says it has been known to rise to the height of a hundred feet in less than a century.

Many large elms are described by Loudon and Strutt, and several of the most remarkable in England are figured by the latter in his "*Sylva Britannica*." The finest of these, the Chipstead Elm, "is sixty feet high, twenty feet in circumference at the base, and fifteen feet eight inches at three feet and a half from the ground. It contains two hundred and sixty-eight feet of timber. Its venerable trunk is richly mantled with ivy, and gives signs of considerable age; but the luxuriance of its foliage attests its vigor, and it is as fine a specimen of its species in full beauty as can be found." — *Sylva Britannica*, p. 60.

"The Crawley Elm stands in the village of Crawley, on the high road from London to Brighton. It is a well-known object to all who are in the habit of travelling that way, and arrests the eye of the stranger at once by its tall and straight stem, which ascends to the height of seventy feet, and by the fantastic ruggedness of its wildly-spreading roots. Its trunk is perforated to the very top, measuring sixty-one feet in circumference at the ground, and thirty-five feet round the inside at two feet from the base." (Ib. p. 62.) This tree is not so large as would seem from this account, as it diminishes very rapidly upwards.

There are many fine trees of this kind in Boston, Roxbury, Dorchester, and some other neighboring towns, but none of very great size.

The largest on the Mall, bordering Boston Common, was measured by Professor Gray and myself in 1844, and found to be twelve feet and three inches in circumference at three feet from the lower side, and eleven feet two inches at five feet. It is a stately and very beautiful tree. The European elms on Paddock's Mall, near Park Street Church, are said to have been planted in 1762, by Major Adino Paddock and Mr. John Ballard. In 1826, several of them measured nine feet at four feet from the ground, having grown more than one and a half inches a year. Several of them now measure nine feet

ten inches at four feet, having grown only half an inch annually, for the last twenty years. This, however, is not surprising, as they are immediately surrounded on all sides by an almost impenetrable pavement, and must get all their nutriment from a distance on one side, beyond a heavy wall. A differently constructed gutter, allowing the water and drainings of the street to penetrate, would doubtless quicken their growth.¹

The noblest and most beautiful English elms in this vicinity are found on the grounds of the country residence of Henry Codman, Esq., in Roxbury. The largest stands by the principal gate in front. At three feet from the ground, it measures seventeen feet and five inches; at five feet, fifteen feet ten inches. It has lost several of its lower limbs, and with them much of its beauty; but it holds its size fully to the height of twenty or twenty-five feet, where it divides into three large branches, the main, central one of which rises upwards to a height much above one hundred feet, perhaps to one hundred and twenty or one hundred and twenty-five. Another, standing on the lawn, within the enclosure, has nearly the same elevation, with a girth of twelve feet eight inches at three feet, and eleven feet seven at five. Several trees of the same kind in the rear of the house are known to have been planted in 1796, so that they have now been planted nearly fifty years. The largest and most northerly of these measures eight feet eleven inches at three feet from the ground. Two others, being the most westerly ones, have each a girth of seven feet ten inches at three feet. The largest of these has thus made an annual growth of more than two inches annually, and the others but little less. All these trees are favorably situated, in the midst of highly cultivated grounds, and the last-mentioned grow in a moist situation near a never-failing stream.

The uses of this tree in England and on the continent of

¹ All these trees have been sacrificed to the supposed necessity of a freer sidewalk.

Europe are very numerous. Its wood is of a brownish color, and is hard and fine grained, and of great lateral adhesion, and it is little liable to crack or split when exposed to sun or weather. It is therefore much employed for ship's blocks and other wooden parts of the rigging. It is also remarkable for its durability in water. It is employed for the keels of large ships, and for pumps, water-pipes, and troughs; for mills and water-wheels, piles, ship-planks beneath the water line; also, for gates and rails, the knotty for hubs of wheels, the straight and smooth for axle-trees, and for innumerable other purposes. A variety called the Twisted Elm, *Orme tortillard*, is very highly valued in France for its extreme toughness, and also for the beauty of its grain. When frequently pruned, the wood of the elm becomes knotted, and is prized by cabinet-makers in France. It takes a fine polish, is very ornamental, and, when stained, extremely beautiful. The knobs which grow on old trees are remarkable for the curious interlacing and twisting of fibres, and, as veneers, are used, like mahogany, for articles of furniture.

As among the ancient Romans, so in France at the present day, the leaves and shoots are used to feed cattle. In Russia, the leaves of a variety are used as a substitute for tea. The inner bark is in some places made into mats, and in Norway, they kiln-dry it, and grind it with corn as an ingredient in bread.

The European elm "produces abundance of suckers from the roots, both near and at a great distance from the stem; and throughout Europe these afford the most ready mode of propagation, and that which appears to have been most generally adopted, till the establishment of regular commercial nurseries. On the Continent, plants are very often procured from stools, simply by heaping up earth about the shoots which proceed from them. These shoots root into the earth; and, after growing three or four years, during which time they attain the height of ten or fifteen feet, they are slipped off;

and either planted where they are finally to remain, or in nursery lines. When they are transplanted to their final situation, the side shoots are cut off; and the main stem is headed down to the height of eight feet or ten feet; so that newly-planted trees appear nothing more than naked truncheons. The first year, a great many shoots are produced from the upper extremity of each truncheon; and, in the autumn of that year, or in the second spring, these shoots are all cut off but one, which soon forms an erect stem, and as regular a headed tree as if no decapitation had previously taken place. All the avenues and rows of elm trees in Europe were planted in this manner previously to about the middle of the eighteenth century; and, according to Poiteau, the same practice is still the most general in France." — *Loudon's Arboretum*, Vol. III., p. 1383.

In England, trees are planted without being headed down; but on the Continent, from the greater warmth of the summers, they are apt to be killed when transplanted with their branches, in consequence of the great evaporation from their leaves. Our summers are even hotter than those of the Continent of Europe, and the practice which has been so long found perfectly successful there, will be likely to be better suited to our climate than the English mode.

A practice recommended by Evelyn (*Discourse*, p. 127) is still in use abroad, and may, in some cases, be very convenient. When, as is often the case in this country, no suckers spring up round the tree, "bare some of the master-roots of a vigorous tree within a foot of the trunk, or thereabouts, and with your axe make several chops, putting a small stone into every cleft, to hinder the closure, and give access to the wet; then cover them with three or four inches of earth, and thus they will send forth suckers in abundance; I assure you, one single elm, thus well ordered, is a fair nursery, which, after two or three years, you may separate and plant in the *ulmarium*, or place designed for them; and which, if it be in plumps, as

they call them, within ten or twelve feet of each other, or in hedge-rows, it will be better; for the elm is a tree of consort, sociable, and so affecting to grow in company that the very best which I have ever seen do almost touch one another: this also protects them from the winds, and causes them to shoot of an extraordinary height, so as, in little more than forty years, they arrive to a load of timber, provided they be sedulously and carefully cultivated, and the soil propitious; for an elm does not thrive so well in the forest as where it may enjoy scope for the roots to dilate and spread at the sides, as in hedge-rows and avenues, where they have the air likewise free."

I have been thus particular in regard to the English Elm, because of its great beauty and rapid growth, and the value of its timber, in which last particulars it is doubtless superior to the American Elm, as, in the others, it is little if at all inferior.

Sp. 4. THE SCOTCH ELM. *Ulmus montana*. Bauhin.

Another elm which has been partially introduced in this country, and is very much cultivated in Scotland and the northern parts of England, is the Scotch Elm, otherwise called the Wych Elm or Wych Hazel. For many purposes, its wood is preferred to that of the English Elm, as it splits more freely. On the whole, however, it is inferior. It resembles our Slippery Elm.

There are several other species of elm known in this country, though I have never found them in Massachusetts. The River Elm, *U. nemoralis*, is said by Pursh (N. A. Flora, p. 200) to occur, rarely, on the banks of rivers from New England to Virginia. He speaks of having seen it growing. It is characterized as having oblong, smoothish leaves, equally serrate, and nearly equal at base, with sessile flowers. Michaux mentions an elm which he saw in Maine, and on the Cham-





NETTLE TREE (*Celtis occidentalis.*)

plain, differing from those which have been described, but which more nearly resembled the common elm.

There is described and figured in Silliman's Journal (XIX., p. 170), by David Thomas, a new species of elm which he calls Racemed Elm, *U. Racemosa*, whose specific character he gives thus:—

“*ULMUS RACEMOSA*. — Flowers in racemes; pedicels in distinct fascicles; united at their bases. A tree. Lower branches, with irregular corky excrescences. Leaves, ovate, acuminate; auriculate on one side; doubly serrate; above, glabrous; under side and ribs, minutely pubescent. Racemes, of several fascicles (often three or four, with a terminal flower); one to two and a half inches long — from the sides of the last year's branches, and often garnished with small but perfect leaves, before the terminal buds open. Fascicles of from two to four flowers. Flowers pedicellate. Calyx, from seven to eight cleft. Stamens, from seven to ten. Stigmas two, recurved. Samara, ovate, pubescent; membrane more extended on one side; margin densely fringed. A native of Cayuga County, in the State of New York, and of the adjacent country.” — *Silliman's Journal*, Vol. XIX., p. 170.

It is possible that this elm, which has some affinity with the Cork Elm of Europe, though evidently a distinct tree, may be found in the western part of this State. I have seen some small trees resembling it in the corky bark, while in other respects they were like the common elm.

X. 2. THE NETTLE TREE. *CELTIS*. L.

This genus contains handsome trees, or tall shrubs, natives of North and South America, Asia, and Europe, with alternate, deciduous, unequal-sided, strongly nerved leaves, axillary flowers, with five stamens, and a calyx of five divisions; and small, sweet, wholesome stone fruit. The nettle trees are of a strikingly elegant appearance, from the breadth of their ample

and richly tufted head. They grow well on the poorest and most arid soils, but flourish best in a soil which is rich and moist. In such situations, their growth is very rapid. The wood of some of the species is remarkable for its hardness and tenacity; of others, too soft to be of much use. Their foliage is rich and abundant, of long continuance, and not liable to the attacks of insects, and is remarkable for falling almost at once. The flowers come out early, before the leaves; and the fruit, which ripens in autumn, remains on the tree till the following spring. The name *nettle tree* has been given from the resemblance of the leaves to those of some species of nettle. There are about twenty species, four of which are found in North America. Several of these trees are very ornamental, and none more so than the two found in Massachusetts.

Sp. 1. THE AMERICAN NETTLE TREE. *C. occidentalis*. L.

Figured in Michaux; Sylva, III., Plate 114, and in this volume. The tree is well represented in Loudon, Arboretum, VII., Plates 192 and 193.

This fine tree has a strong resemblance to an elm, and is often, by careless observers, mistaken for one. Its branches have something of the drooping character of those of the common elm, but much less than they, and are more inclined to spread horizontally. The trunk is covered with a grayish and rough bark. It seldom extends to a considerable height, without throwing out numerous, slender branches. The ultimate branchlets are extremely slender, downy when young, and covered with a reddish brown bark. The leaves, commonly from one and a half to three inches long, and from one to two broad, vary much on the fruit-bearing and on the vigorously growing limbs. On the latter, they are large, rather thick, broad and conspicuously serrate; on the former, they are smaller and more delicately shaped, more sharply serrate, and have a much longer acumination. On both, they are downy when young, and rough on both surfaces, but afterwards be-

come nearly smooth. They are ovate in their general outline, acute, rounded, or obtuse, and sometimes slightly heart-shaped at base, commonly unequal-sided, but sometimes equal-sided; very irregularly dentate or serrate about the middle, and end in a long, taper, entire point. They are borne on slender footstalks, which continue slightly hairy till late in the season. The leaves are of a dark green, which turns to a bright yellow in autumn, when they fall, nearly all together.

The flowers come out very early, on long footstalks, from one to three in the axils of the leaves. They have a calyx of five, or sometimes six, divisions, with five or six stamens. The lower flowers have usually stamens only, and are barren; the upper, solitary flowers have also an ovary, which becomes a fruit. This is sweet to the taste, about the size of a wild cherry, has a large stone, and, when perfectly ripe, is of a dark purple color. The tree might be described, to one who wished to be able to recognize it, as an elm, bearing purple, sweet cherries, which continued on the stem through the winter.

Douglas says that this tree is found on the rocky banks of the Columbia River, in places so dry that no other tree can grow there. Michaux had never observed it northward of the Connecticut River. I have found it, never in great numbers, in almost every county in the State. It was pointed out to me at Savin Hill, by Dr. Bigelow, and in Dorchester by Dr. Harris. It is almost everywhere so rare that its name is unknown; and it might well be called, as it was by the French in Illinois, *Bois inconnu*, unknown wood. In Bristol County, where it is often found, and whence a fine specimen of the wood was sent me by an attentive observer of nature, — Micah Ruggles, Esq., of Fall River, — it is called False Elm, from its strong resemblance. In Middlesex, it is so rare that a friend, whose eye is open to whatever is curious in nature, and who showed me specimens of its leaves, had been unable to find any name for it among the common people, his neighbors. It

is, throughout the State, a small tree, seldom rising above forty or fifty feet in height, and twenty or twenty-four inches in diameter.

It is said by Torrey, who gives it the name of *beaver wood* and *hoop ash*, to be found, particularly in rocky situations, on the banks of rivers. Specimens of the leaves and wood have been sent me from the banks of the Potomac, under the names of *sweet gum* and *sugar berry*. Elliot says that along the margin of salt water, in the sea islands of Carolina, where it grows in light, rich soils, it sometimes attains the height of sixty or eighty feet, and a diameter of three or four. Michaux had found it in greatest vigor on the Savannah, where, in a cool and shady situation, he had seen trees sixty or seventy feet high, and eighteen or twenty inches in diameter.

This is so rare a tree that I have not been able to find that any one is acquainted with the qualities of its wood. Michaux supposed, from its similarity to the European nettle tree, that it must have the same properties. That tree (*C. Australis*) is supposed to have been the Lotus of the ancients, the sweet fruit of which was the food of the *lotóphagi*, and which Homer describes as so delicious that those who ate thereof straightway forgot their native country, or lost all desire to return home.

The European is a small tree, seldom fifty feet high, or three in circumference. Its wood is extremely compact, taking a place between that of the live oak and the box for density and hardness. It weighs, when dry, according to Baudrillart, 70 lbs. 3 oz. per cubic foot. It is susceptible of a high polish, and, when cut obliquely across the fibres, resembles satin wood. It is used for making furniture, and by carvers for images of the saints. The branches are very supple, tough, and elastic, and are much used, in the south of France, for making hay-forks. In that country, plantations of it for that purpose are common. In the department of Gard, seven acres of rocky land, unfit for any other use, planted with net-



HACKBERRY. *Celtis crassifolia*.



the trees, yield annually five thousand dozen of hay-forks, giving a revenue of five thousand dollars yearly. When cut close to the ground, the stem sends up numerous vigorous shoots, of great flexibility. Planted close, in masses, they rise to considerable height, without much thickness, furnishing admirable handles for coach-whips, ramrods for muskets, and walking-sticks. And so highly are they valued that, according to Baudrillart, all the coachmen in Europe are supplied from plantations on rich soil in Narbonne, which are made expressly for this purpose. It is also used for the shafts and axletrees of carriages, the naves of wheels, and for musical instruments. The root is used for dyeing yellow; the bark for tanning; and an oil is expressed from the stones of the fruit. — *Loudon's Arb.*, 1415.

Sp. 2. THE HACK BERRY. *C. crassifolia*.

Leaves and fruit represented (incorrectly) in Michaux, *Sylva*, III., Plate 115.

Michaux assigned the banks of the Delaware as the northeastern limit of the hack berry. I find, however, that it grows in Massachusetts, on the banks of the Connecticut; and I have recently had a fine tree pointed out to me by Mr. Francis, of Lowell, growing near the canal in that city, on the banks of the Merrimac. I have examined this tree, and five others in the neighborhood, and I find them differ very much from any trees I had previously examined. The bark of the trunk is excessively rough, covered, almost everywhere, with knobs, knurls, and rugged protuberances, large and small, left by the swelling of the wood about the base of every branch, however small, especially on the upper side, where it looks like an effort to fill up the angle. The tree is excessively — more than any other tree — full of branches, which go out at a very large, often a right, angle. The minute stems, on which the flower stems grow, seem to be mostly caducous; but, when perma-

ment, are, like all the branches, covered with knobs. The dark reddish, mature fruit rests on a stem about half an inch long. It is very sweet, with a large stone. In the end of autumn and beginning of winter, the tree seems far more full of fruit than any other plant to be seen, and is very attractive to the winter birds. The largest tree examined, which is thirty or forty feet high, measured seven feet six inches round, — that is, two feet and six inches in diameter, — at three feet, making it larger than any tree of the kind which has been described. Its general aspect, as seen at a distance, is that of an oak, but incomparably more full of little branches. Specimens of the leaves, which I had gathered as those of the nettle tree, turn out, on careful examination, to belong to this tree. I have found it in only two places, — in Springfield, on the east side of the Connecticut River; and in West Springfield, on the west. Some of the trees are, I hope, still standing. The most remarkable one has been destroyed. It grew a few rods north of the Hampden House, in the broad county road, in Springfield. When I measured it, in September, 1838, its girth, at three feet from the ground, was sixteen feet ten inches; at four, it was fourteen feet three inches; at six, thirteen feet. It had gnarled, projecting roots, putting out on every side till nearly three feet from the surface. It diminished, gradually, to the height of twelve or fifteen feet, and there had several broad, irregular protuberances, where it had lost large limbs. Above this it tapered rapidly, dividing into three branches, which formed a small, round, rather dense top, fifty or sixty feet high. It was covered with a very rough, brownish gray bark, and had, altogether, so much the aspect of an elm that it was almost universally taken for one. I was informed that a still larger tree of the same kind had formerly grown near it. Within two years, this noble tree has fallen, like its brother, before the axe of *improvement*. The leaf-bearing branchlets are very slender, slightly downy, and covered with a reddish brown bark. The buds are small, compressed, and rather

pointed. The leaves are four or five inches long and less than two wide, borne on a small, round, short, somewhat hairy, stalk. They are unequal-sided: the side next the branch being much broader than the other and strongly half-heart-shaped; the other side being sometimes, but not always, half-hearted. They are oblong, tapering very slowly, ending in a long acumination, and sharply serrate almost to the very point; rough on both surfaces, bright green above, pale beneath. They are less thick than the leaves of the nettle tree; although, in other respects, they correspond sufficiently well with the description and figure of Michaux.¹ To him and to other writers, I am indebted for the remainder of this description; for I have not seen the flowers, fruit, or wood.

The trunk is commonly straight and without branches to a great height. The bark is grayish and broken, thickly and irregularly set with hard, blackish, permanent, corky asperities. The branches are nearly horizontal and slender. The branchlets inclined or pendent, small, close-set, brown, scattered, with small, whitish warts; the young ones green, more or less downy. The leaves on the vigorous shoots are from four to seven inches long, and often of equal breadth, deeply toothed and rough, sometimes almost equal-sided, sometimes exactly heart-shaped, sometimes half-heart-shaped, or ovate-lanceolate. The stipules are linear-lanceolate and pointed. Flowers of the size of those of the nettle tree, with the segments of the perianth oblong, obtuse, fringed at tip, ciliate on the border. Ovary conical, surmounted with stigmas twice its own length. Fruit-stalks half an inch long. Drupe of the size of a large pea, and of a brownish red. — *Spach*, XI., 431.

Michaux says, "This is one of the finest trees that compose the dusky forests on the upper part of the Ohio. It associates with the buttonwood, black walnut, butternut, bass wood, black sugar maple, elm, and sweet locust, which it equals in

¹ Spach, who is familiar with the tree as cultivated in France, finds fault with this figure, because the fruits are incorrectly represented as black, and as growing upon a stout and vigorous shoot with large and thick leaves.

stature, but not in bulk, being sometimes more than eighty feet high, with a disproportionate diameter of eighteen or twenty inches. The wood is fine-grained and compact, but not heavy, and, when freshly exposed, it is perfectly white: sawn in a direction parallel or oblique to its concentrical circles, it exhibits the fine undulations that are observed in the elm and the locust. On laying open the sap of this tree in the spring, I have remarked, without being able to account for the phenomenon, that it changes in a few minutes from pure white to green. On the Ohio and in Kentucky, where the best opportunity is afforded of appreciating this wood, it is little esteemed, on account of its weakness and its speedy decay when exposed to the weather. It is rejected by wheelwrights; but is sometimes employed in building, for the covering which supports the shingles. As it is elastic and easily divided, it is used for the bottom of common chairs, and by the Indians for baskets. On the banks of the Ohio, it is frequently taken for the rails of rural fence; and is wrought with the greatest ease, as it is straight-grained and free from knots: it is said, also, to afford excellent charcoal."

"The hack berry is certainly one of the most beautiful trees of its genus, and one of the most remarkable for height and for majesty of form. In rich soils, the luxuriance of its vegetation is shown by sprouts six, eight, and ten feet in length, garnished on each side with large, substantial leaves. In France, it is principally esteemed for the rapidity of its growth." — *Sylva*, III., 47, 48.

Spach says it grows readily on all kinds of soil, and is remarkable for its beauty and for the rapidity of its growth.

There are two trees of this family of such value for their wood, and of such beauty, that they ought not to be passed without notice. The one is the Planer tree, *Plánera úlmifolia*, of Michaux, which is found on the banks of the Mississippi, and in Kentucky and Tennessee. The other is the Zelkoua

or Tselkwa, *Plánera Richardi*, of Michaux, a native of the country between the Black and Caspian Seas, from lat. 35° to 47°. This was introduced into France in 1782, by the elder Michaux, and has since been cultivated both in that country and England. Its trunk resembles that of a beech, being kept smooth by the exfoliation of the outer bark. It is a lofty, richly tufted, and picturesque tree, remarkable for its rapid growth, and for its shining green leaves being not liable to the attacks of insects. Its wood is of very great value, extremely beautiful, heavy, dense, and hard, finely-veined, and susceptible of the highest polish; and surpassing oak in durability, never becoming worm-eaten, however old it may be.

There is another tree, belonging to the family of *Balsam-âceæ*, for which I have hitherto searched New England in vain, which yet is probably found here, as it occurs abundantly in parts of New York nearest us. It is the Sweet Gum, *Liquid-âmbar styraciflua*, whose star-like leaves are so conspicuously beautiful in the woods of New Jersey in autumn. This grows well in the neighborhood of Boston.

FAMILY XI. THE SANDAL WOOD FAMILY. *SANTALACEÆ*.

R. BROWN.

This family, which receives its name from the *Santalum*, one species of which produces the well-known odoriferous sandal-wood, comprehends trees, shrubs, under-shrubs and herbs. The flower-cup is three or five cleft, greenish and leaf-like externally, and colored internally. A fleshy disk, which is entire or lobed, occupies the bottom of the flower, and adheres to the base of the flower-cup or to the ovary. The stamens are equal in number to the lobes of the flower-cup, or twice as many. The ovary is one-celled, with from one to four ovules. The fruit is a drupe or nut, one-celled and one-seeded. The leaves are alternate, and undivided. In North America, it includes trees as well as some small herbaceous plants; in New Holland, the East Indies, and the South Sea Islands, trees and shrubs; in Europe, only inconspicuous weeds.

One genus of the trees of Massachusetts belongs to it, THE TUPELO, *Nyssa*. L. This is placed by some writers¹ in the Linnæan class Diœcia, order Pentandria; by others,² in Pentandria, Monogynia; by Linnæus himself and others,³ in his class Polygamia.

On different trees three kinds of flowers are found; some containing only stamens, others stamens and a pistil, others only a pistil. None have a proper corolla. In the staminate flowers, the calyx is five-parted; the stamens, from five to ten or twelve, inserted around a glandlike disk. In the pistillate flowers, the calyx is five-cleft; stamens five or none; the style simple, often revolute; succeeded by a one-seeded, somewhat fleshy, drupe, containing an ovate, striate nut.

This genus is confined to North America. The trees grow by streams or stagnant waters. They have alternate leaves,

¹ Nuttall, Elliott.² Darlington.³ Bigelow.



TUPELO. (*Nyssa multiflora*.)

entire, or with large angular teeth, and are smooth, reticulate, or downy beneath, and flowers springing from the axil of the leaves, the male in racemes or heads, the fertile solitary, or with two or three on a stem.

Of the trees of this kind found in this State, varying exceedingly in their shape, and especially in their leaves, I have had great hesitation whether to consider them as belonging to two or three species, or only as varieties of one. I am rather inclined to the latter conclusion, and that they belong to the species which has been called —

THE TUPELO TREE. *Nyssa Multiflora*. Walter.

In Bristol County, and the other south-eastern counties, this is called the Snag Tree, and sometimes Horn Pine. In the western parts of the State, it is called Pepperidge; and often, in every part, it is called Hornbeam, from the extreme toughness of the wood. It is nowhere called Gum Tree, by which name it is commonly known in the Middle and Southern States. The most suitable name, and one not appropriated to any other tree, is Tupelo, the name by which it and several other species of this genus were known to some tribes of the aborigines.

The Tupelo is always a striking, and often a very beautiful, tree. It usually rises to a height of not more than thirty or forty feet; but, in dense, moist woods, where it has been surrounded by other tall trees, I have seen it sixty or seventy feet high. No tree varies more in its aspect. In the neighborhood of Boston, where it abounds, especially in the low grounds in Cambridge, on the borders of Jamaica Pond, and in other places in Brookline, it is a low tree, throwing out a very great number of horizontal or drooping branches, forming a short, cylindrical head, flat above. Where it has long stood by itself, and its natural tendency has been completely

unimpeded, it forms a low, very broad, palm-like head. Sometimes it is pyramidal or conical; and sometimes the dense mass of foliage has the shape of an inverted cone, very broad and flat at top.

The trunk, which is almost always erect, and which seldom rises many feet, — commonly not more than six or seven, — before it throws out branches, — is invested with a dark ashy gray bark, much, but not deeply, broken by longitudinal furrows. In very old stocks it is sometimes broken into somewhat regular polygons. The branches, which are far more numerous than on any other tree, frequently so close to each other that it would be difficult to find room for more, are almost uniformly horizontal near the trunk, and arch downwards towards the extremities. Often very crooked, they are thickly set with smaller ramifications, which form a short spray, projecting in every direction. The bark on the new shoots is of a bright apple or reddish green, on the older branchlets it is red or brownish, shining through a pearly, thin epidermis. The leaves, which are alternate on the growing shoots, but in tufts of four or more on the ends of the lateral branchlets, are of a resplendent green above, reflecting the light like those of a tropical plant. They are somewhat paler beneath, and vary in shape from lanceolate to broad oval, and obovate, and in size from one inch to four or five inches in length, and from one-half an inch to two inches in breadth. They are usually wedge-shaped at base, sometimes taper to a long point, sometimes are obtuse, and even emarginate or slightly notched, at the extremity. Generally, they are entire at the edge, but I am acquainted with some trees which constantly bear leaves of a very large size, and notched with several large teeth towards the extremity. The surface is sometimes perfectly smooth above and below, most frequently hairy or downy beneath, especially when young. The texture is rather firm and coriaceous. They are borne on short, roundish petioles, flat above, green, or of a rich scarlet or crimson color, when

exposed to light: and to some shade of these colors, the whole leaf turns in early autumn. The petiole often has an expansion or margin on each side, and is invested with ciliate rows of hairs, which usually fall off as the leaf grows old. The sterile flowers sometimes form little umbels or heads of from four to eight greenish flowers on the end of a downy footstalk of a uniform size, and an inch or less in length, — sometimes the footstalk terminates in an open cluster of from two to five or six flowers, which are very small, and of a yellowish green, and rest on very short stalks. The flower consists of from four to eight, oblong or ovate, pointed, obtuse, or emarginate green sepals, with from four to eight or ten stamens rising from beneath or from the edge of a glaucous, fleshy disk.

The fertile flowers form a close whorl of three or more very small flowers, sometimes but two or one, on the end of a short, club-shaped footstalk, which lengthens as the fruit advances, till it becomes one or two inches long. The fruit, of which seldom more than one or two, on the same footstalk, come to perfection, is an oblong or elliptic drupe, of a deep blue-black, when mature, consisting of a little acid flesh, enveloping a very hard stone, longitudinally striated.

Very little use is made of the wood of this tree. From the crossing and intertwining of its fibres, it is excessively difficult to split, and therefore, when employed as fuel, it is reserved for logs and back-sticks. In the Middle States, it is used to form the naves of wheels. But, for this purpose, it is less suitable than the elm, as it is said to be more liable to decay, when exposed to the weather. It has been sometimes turned into bowls and other wooden vessels, for which its toughness renders it peculiarly fit. It is better fitted than any other tree to be made into the pipes of aqueducts, as it requires no hoops; and it has been extensively employed for this purpose in the salt works at Syracuse, and the neighboring towns, in New York. It is of a yellowish color when freshly cut.

As an ornamental tree the Tupelo deserves more attention than it has received. The brilliant color of the green of the leaves, and the rich scarlet and crimson to which they turn in autumn, at which season some of the trees are covered with the bright blue fruit, make it always a beautiful object.

I have been often struck with the appearance of extreme vigor and healthfulness in the young trees,—and some of the old ones are amongst the noblest in the State.

There is a tree of this kind at Cohasset, which was first pointed out to me by the Rev. Dr. Greenwood, a man of taste, who was a lover of trees, and which we rode twenty-five miles expressly to see. It is richly worth a much longer journey. It stands in a lone pasture, half a mile or more eastward from a place called the Gulf. At the surface, just above the roots, it is eleven feet in circumference, and it is nine feet and two inches, up to the larger branches, which begin at about seven feet from the ground. The trunk loses little of its diameter for near twenty feet, although in that space, twenty large branches, and many small ones put out. These are very large, and project horizontally on every side to a great distance, with an air of mighty strength and power of resistance. The bark is cleft into long prismatic ridges, nearly two inches high, which, on the larger branches, are broken into hexagons, with an approach to geometric regularity. It is of a mouse color, or purplish ashy gray, with white clouds of pertusaria, and greenish and bluish ash parmelias. The height is forty or fifty feet. The average breadth of the head sixty-three feet, its extreme breadth sixty-six. The whole head is of a broad, irregularly hemispherical, shape, flat at top. A striking circumstance in this tree is the fact that the enormous horizontal branches push out as boldly seaward as in any other direction, though the north-east wind sweeps from the Bay in this quarter with a violence which has bent almost every other tree towards the land. I have observed many other instances of the vigor with which the tupelo stands out against the sea breeze.

Another fine tree of the same kind is near by, rising to seventy or eighty feet in height, without large branches till towards the top.

Farther landward is a noble tree, sixty feet high, with a large flat top. This, at two feet from the surface, is six feet two inches in circumference; and, at from four to eight or nine feet, five feet eight inches. Its branches are small and nearly erect, a few large ones coming out at twenty or twenty-five feet from the ground. It is a remarkable thing to see trees of the same species, growing near each other, so entirely unlike in aspect and habit as these.

Three or four other species of *Nyssa* are found in the United States, and, where well known, are considered by botanists as distinct. Those who are acquainted with these will have recognized, in the above description, which is taken from nature, peculiarities of some of the other species. An attentive study of the protean forms of the oak has led me to doubt the value of distinctions of nearly allied species, founded on any thing but the fruit. Till I shall have had better opportunities of examining the fruit of the several varieties of *Nyssa*, I shall not be able to say, confidently, whether there is only one, or whether there are several species in the State.

The tupelo is found around the ponds in Plymouth County, about Buzzard's Bay, in the swamps in Franklin, and the other river counties, and in other parts of the State. It is found near Portsmouth, N. H., and in the Middle and Southern States, as far as Carolina and Georgia. It formerly grew, in large numbers, in a swamp in Cambridgeport, now become a thickly settled part of the town; and there are still to be seen some very remarkable specimens on the lane leading up to the residence of the late Andrews Norton, not very far from Harvard College.

FAMILY XII. THE CINNAMON FAMILY. *LAURINEÆ*.
VENTENAT.

Most of the plants of this family are trees of great beauty, and often of a lofty stature. It also contains shrubs, and a few leafless, parasitic, climbing herbs. Only eleven or twelve species were known to Linnæus, all belonging to the genus *Laurus*; but the family now contains more than four hundred species, divided into more than thirty genera, of which the greater part are natives of regions between the tropics; some few are found in the northern temperate zone; and Massachusetts is, in this country, very nearly their northern limit. All are remarkable for their warm, stimulating, aromatic properties, owing, usually, to essential oils, which abound in their bark and leaves. Several species, in different eastern lands, yield the different sorts of cinnamon and cassia, the genuine being the produce of varieties of the *Cinnamomum zeylanicum*. Camphor is extracted from the roots of the *Camphora officinarum*, by boiling. It is also found, in ample or minute proportion, in the wood of the trunk or root of many other species. The delicious Avocado pear, the aguacate of the Spaniards, often called by the English the Alligator pear, and said to be worth a voyage from Europe to the West Indies to taste, is produced by a tree of this family, the *Pérsea gratissima*. The wood of many of the species, found in south-eastern Asia, retains the pleasant, camphorette odor many years, and is sought for as the material for the finishing and furniture of oriental dwellings; as in beauty, hardness, and durableness, it sometimes vies with mahogany. The *sweet-wood* timber of Jamaica, and many valuable woods of South America, are the produce of trees of this family. The botanical name is derived from the only plant of the family indigenous to Europe, the bay tree, *Laurus nobilis*, the laurel of the ancients, the emblem of victory and of clemency, and sacred to their god

Apollo. Victorious generals were crowned with a wreath of bay leaves, — an honor which, in later times, has been transferred to distinguished poets, the so-called poets laureate. The name of baccalaureate derived from the Latin *baccalaureatus*, of bachelor of arts — seems to have had a similar origin from *bacca laurea*, the laurel berry.

The leaves are mostly evergreen, usually coriaceous, smooth and shining. The flower-cup is of one piece, with four or six divisions arranged in two rows, and with a fleshy disk occupying its centre. The flower is sometimes perfect; sometimes fertile and sterile flowers are on different plants, or on the same. The stamens are as numerous as the divisions of the flower-cup, and opposite to them, or two, three, four, five, or six times as numerous. When there are more than three rows, the inner ones are sterile. The anthers open by valves, which curve upwards. The fruit is a one-seeded berry or a drupe, usually supported on a thickened, club-shaped stalk.

The only genera found in this State, are the Sassafras and the Spice Bush or Winter Bush, *Benzoin*; the former a tree, the latter a shrub. Both have six-parted, yellowish flowers, with nine stamens. All are all fertile in the male flowers; the female, six- or eight-merous.

The Sassafras has four anthers opening with four valves, and its fruit borne on a thickened and fleshy at the extremity. The Spice Bush has anthers with only two valves, and its fruit-stalk is thickened at the extremity.

XII. SASSAFRAS TREE. *SASSAFRAS* *VALE*. Nees Von Esenbeck.

Figure. *Bot. Mag.*, II., Plate 144; in Michaux, *Sylva*, Plate 81; in *Botany*, II., Plate 35; and in our Plate.

The Sassafras in this State, rarely reaches thirty feet in height, and is often much shorter. I have, however, measured some specimens of it from thirty feet high and nearly two feet

in diameter. The old tree is a striking but not a beautiful object, — at least when the trunk is visible, which is rarely erect, but usually bending upwards, and sometimes crooked. The bark, on old stems, is of a reddish ash color, deeply and irregularly cracked, with the sides of the furrows striated with black and gray lines, showing the annual layers. The color of the interior of the bark is dark red, like some kinds of cinnamon. The branches are numerous, bare, and crooked. The young tree is often beautiful, from the rich color of the luxuriant foliage and the recent shoots; and on young and old trees, the head is broad, round, and finely tufted. The living bark is commonly free from most kinds of lichens; but an occasional dead branch will be found covered with *Lecanoras* and *Lecideas*, and patches of common and golden-eyed *Parmelias*. On young trees, the bark is a reddish green, striated with ash; the branches are in imperfect whorls, and stand nearly at right angles to the trunk, curving slightly from branchlet to branchlet. On old trees, the appearance of regular whorls in the branches is lost, from the smaller ones being outstripped by the larger, and some of them dying; and the graceful curvature is lost, and the branches are bare and crooked. The spray is long and irregular, forming a sharp angle with the small branches, and curving upwards. It is of a yellowish green color and downy surface. The terminal buds are large, ovate, and invested at base with three or four scales of the color of the twig.

The leaves of the same tree are remarkable for their variety of form. They are supported on petioles of one quarter or one fifth the length of the leaf, are acute or wedge-shaped at base, often entire, sometimes oval, with an imperfect lateral lobe; more frequently, especially towards the ends of the branches, dilated and three-lobed. They are of a pleasant green; in the autumn becoming a delicate buff, leather-yellow or orange. The scales of the buds, which are covered with down, on expanding, remain to protect the branch of leaves



and flowers which they enclosed, and which are alike clothed at first with a hairy or silken down. The under surface is marked by prominent veins. The flowers are on pendulous or nodding, slender, clustered racemes, in the axils of the bud-scales, below the leaves, around the base of the recent shoots. Each partial flower-stalk has, at its base, a slender, thread-like, villose bract, as long as the footstalk. In the sterile flowers, the calyx usually has six yellowish, oblong, petal-like pieces, united at base to form a cup; inside of which and opposite them are six stamens, forming one circle; and inside them and opposite the alternate ones, a circle of three stamens, on each side of each one of which is an orange-colored gland on a short stalk. The anthers are short, having two cells opening inward; and above, two smaller cells opening obliquely upwards. The style, swelling at base, stands freely in the centre, but with no ovule within.

The fertile flowers have only six short, imperfect stamens, in a single series. Ovary roundish, stigma on a short style. The fruit is an oblong oval drupe, of a dark blue, when ripe, supported by a dark red, thickened, club-shaped footstalk. They are eagerly sought after by birds, and therefore soon disappear. When perfectly ripe, and before they have begun to be preyed upon, they form a beautiful contrast with the agreeable green of the leaves.

Few of the insects which frequent the sassafras trees have been attentively studied. Caterpillars of the rabbit tussock-moth, *Lagoa opercularis* of Dr. Harris, are often found feeding on their leaves, as are those of the *Saturnia Io*; and, within the leaves, the caterpillar of the *Attacus Promethea* butterfly spins its cocoon and spends the winter. — (*Harris's Report*, pp. 265, 281 and 283.) The leaves, also, sometimes furnish nourishment to caterpillars of the *Attacus luna* butterfly. — (*Drury*, I., 45.)

The wood, in young trees, is white, but becomes reddish on growing old. It is very brittle, and branches of some size may be broken with little effort; and yet the seasoned wood

combines lightness and toughness in a higher degree than almost any other wood, and is therefore preferred for the purpose of making the smaller joints of fishing-rods. It is soft and close-grained, and is said to resist decay for a long time when exposed to the weather. Its odor is supposed to be disagreeable to insects and worms, to whose attacks it is said not to be liable; for which reason it is sometimes used as the material for bedsteads, and for trunks and drawers for clothes. It is also used for rafters and joists. As fuel, it is little esteemed, as it snaps in the fire, like the wood of the chestnut.

In the south-western States, the dried leaves are much used as an ingredient in soups, for which they are well adapted by the abundance of mucilage they contain. For this purpose, the mature green leaves are dried and powdered, the stringy portions being separated, and are sifted and preserved for use. This preparation, mixed with soups, gives them a ropy consistence, and a peculiar flavor much relished by those accustomed to it. To such soups are given the names *gombo filé* and *gombo zab*.

In Virginia and the more southern States, a beer, considered a healthy drink for the spring and summer seasons, is made by boiling the young shoots in water, adding molasses, and fermenting. The taste of the leaves is mucilaginous and pleasant; of the fruit, disagreeably spicy.

For its medicinal properties, the sassafras has long been celebrated. On this account, it was much sought for by the earliest visitors to America; and its roots formed a part of the first cargo exported from Massachusetts.¹ At that time, it "commanded an extravagant price, and treatises were written to celebrate its virtues." The following account is from Dr. Bigelow's *Medical Botany*, II., p. 144:—

"The bark of this tree has a fragrant smell, and a very agreeable, spicy taste. The flavor of the root is most powerful, that of the branches more pleasant. The flavor and odor

¹ Gosnold, in Belknap's *American Biography*, I, 233.

reside in a volatile oil, which is readily obtained from the bark by distillation. It is of a light color, becoming darker by age, very pungent, and heavier than water, so that it sinks in that fluid when the drops are sufficiently large to overcome the repulsion at the surface. The bark and pith of the young twigs abound with a pure and delicate mucilage. A very small quantity of the pith infused in a glass of water gives to the whole a ropy consistence, like the white of an egg. This mucilage has the uncommon quality that it is not precipitated, coagulated, or rendered turbid by alcohol. It continues in a perfectly transparent state when mixed with that fluid, though it does not unite with it. When evaporated to dryness, it leaves a light-colored, gum-like residuum.

“The volatile oil and the mucilage appear to contain all the medicinal virtue of the tree.

“The bark and wood of the sassafras were formerly much celebrated in the cure of various complaints. It is now recognized only with regard to its general properties, which are those of a warm stimulant and diaphoretic.”

A decoction of the bark is said to communicate to wool a durable orange color.

The sassafras is found as far north as Canada. It is there, however, a small tree, not often exceeding fifteen or twenty feet in height. In the Middle States, it is found forty or fifty feet high, and two feet in diameter, and in the Southern and Western States is said to attain a still loftier stature. “From Boston to the banks of the Mississippi, and from the shores of the ocean in Virginia to the remotest wilds of Upper Louisiana beyond the Missouri, comprising an extent in each direction of more than one thousand eight hundred miles, the sassafras is sufficiently multiplied to be ranked among the most common tress.” — *Michaux*, II., 145.

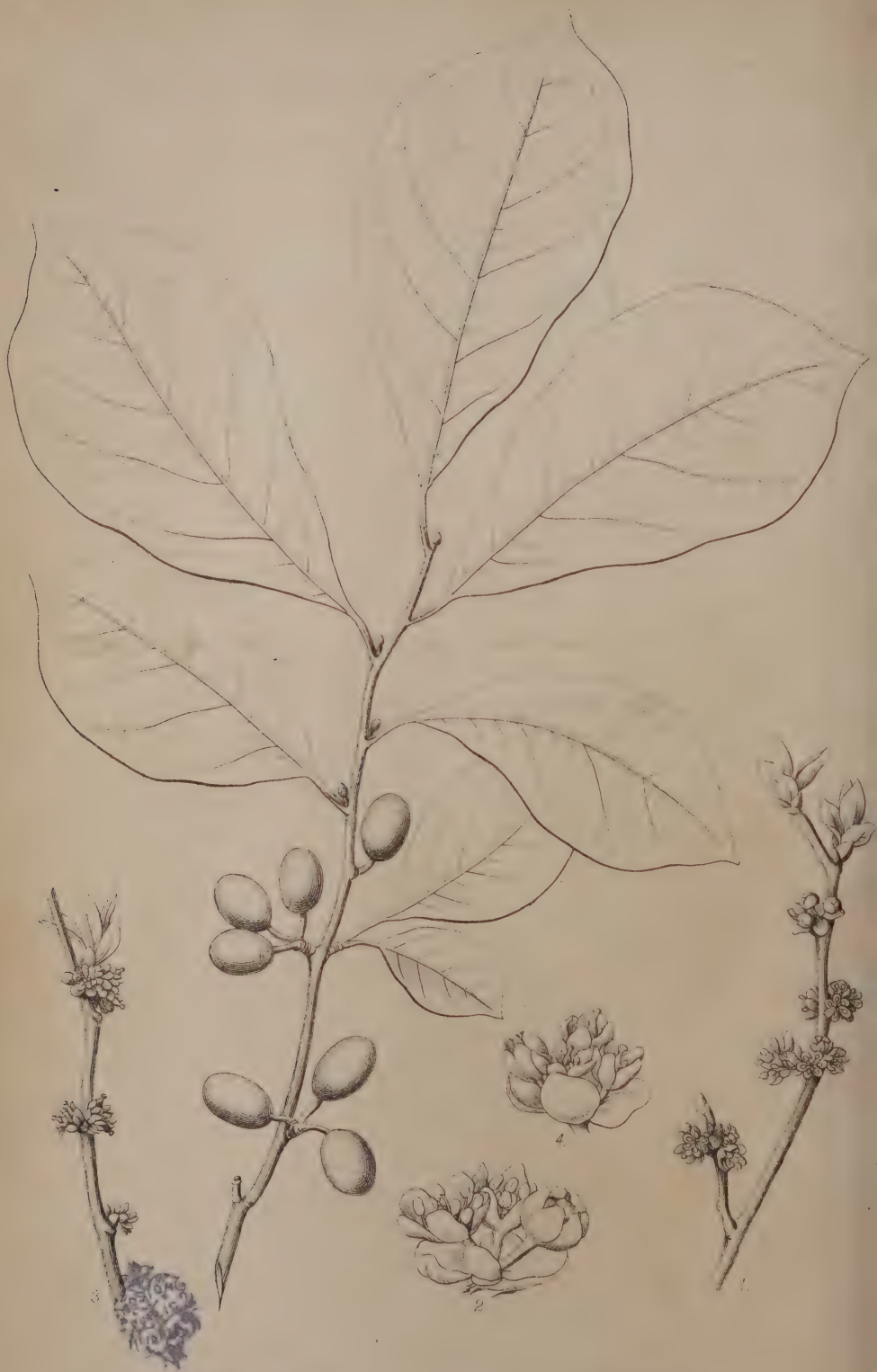
It is found in almost every part of Massachusetts, and seems to flourish in almost every kind of soil. In the vicinity of Boston, in soil resting upon crumbled grauwacke, it attains

larger dimensions of diameter and height than I have elsewhere observed it. It is nowhere found very abundantly; but is usually allowed to remain, out of regard for its medicinal properties, and the beauty of its foliage and fruit, about fences, and on the borders of fields, where it is most frequently seen. This tree has the credit of having aided in the discovery of America, as it is said to have been its strong fragrance, smelt by Columbus, which encouraged him to persevere, and enabled him to convince his mutinous crew that land was near.

The sassafras never grows to the size of a tree of the first class. One was growing, in 1842, in West Cambridge, which measured more than three feet through at the base, and rose without a limb more than thirty feet, with a trunk very straight and slightly diminished, above which it had a somewhat lofty and broad head. It was nearly sixty feet high, and had been long growing by itself. It was felled, and its roots dug up, *to allow a stone wall to run in a right line*. Such pieces of barbarism are still but too common. A tree so beautiful and lofty, and of such rare dimensions, such an ornament to a bare hillside, sacrificed to the straightness of a wall!

The sassafras has been much cultivated in England as an ornamental tree. It is usually propagated by seeds imported from this country. These, as soon as received, are sown or put in a rot-heap, as they sometimes remain two or three years in the ground before they come up. It may be also propagated by suckers, which spring up in great numbers from the long creeping roots of old trees.

Several other species of sassafras are found in this country.



FEVER BUSH. (*Benzoin odoriferum* .)

XII. 2. FEVER BUSH. SPICE BUSH. *BENZOLIN*
ODORIFERUM. Nees Von Esenbeck.

The spice bush is a shrub, from four to ten feet high, with long, tapering, brittle branches. The recent shoots are smooth, and of a bright green, which, in the next year, takes an olive tint, and afterwards a pearly gray, which becomes darker on the older stalks. The leaves are from two to five inches long, and one or two wide, scattered, very entire, broad lanceolate or obovate, sometimes almost rhomboidal, tapering at base, abruptly pointed, sometimes obtuse, smooth and of a pleasant soft green above, pale or glaucous beneath; revolute and delicately ciliate on the margin; supported on leaf-stalks about half an inch long, smooth, or rarely downy. In April or the early part of May, clusters of from three to six flowers, of a greenish yellow, on very short pedicels, appear from buds distinct from the leaf-buds, in the axils of the last year's leaves. What seem to be petals are a calyx of six oblong, obtuse segments. The stamens are somewhat shorter, nine in number, in two rows, six exterior and three interior, alternating with stamen-like bodies; the filaments of the inner series trifid, with the lateral segments short and terminating in two-lobed glands. Anthers two-celled, cells opening by vertical, elastic valves. Ovary roundish, surmounted by a short thickish style. Fruit a dark red or purple drupe, of an oval shape, in bunches of from two to five, by the side of the base of the short leaf-branches, which are sometimes abortive. The stem is short and stout, not so long as the fruit. While green, the drupe has the black style in a terminal hollow.

This plant is remarkable for its graceful form, and large, handsome leaves, particularly when found growing in the deep shade of a moist forest. Such a situation, where it seems most vigorous, is not favorable to the production of its flowers and fruit.

This plant derives its botanical name from its aromatic odor, resembling gum benzoin. This is to some persons always disagreeable, and, when the leaves are bruised, oppressively strong. The bark is stimulant and tonic, and has been used in intermittent fevers. The berries are said to have been sometimes used in place of allspice. In Pennsylvania, a decoction of the branches is often used as a medicinal drink for horned cattle, in the spring of the year. — *Darlington*.

Two or more species of Benzoin are found in the Southern States. Nuttall proposed, while the Sassafras and Benzoin were still united with *Laurus*, to separate them from the other species, and unite them in one genus, *Euosmus*.

FAMILY XIII. THE MEZEREUM FAMILY. *THYMELACEÆ*.

LINDLEY.

This contains shrubby plants wanting a corolla, but having a corolla-like, colored calyx, and a very tough bark. The calyx is tubular, with its border usually four-cleft, and with four or eight stamens growing from its tube. Most of the plants belong to the Cape of Good Hope and Australia; many are found in the cooler parts of India and South America; a few, in Europe and Middle Asia; a single genus is found in North America.

The plants of this family are distinguished for an acrid or caustic principle in the bark. When chewed, it produces a burning sensation in the mouth, and, taken into the stomach, causes heat and vomiting or purging. Applied externally, it slowly produces a blister. The bark is made up of interlaced fibres of great strength, from which cordage has been made. A sort of natural lace is formed of it in the Lagetta, or Lace Bark of Jamaica. In Nepaul, paper has been manufactured from it. A yellow dye for wool is formed from two plants of this family, in the south of Europe.

THE LEATHER WOOD. *DIRCA PALUSTRIS*. L.

Figured in Bigelow's Medical Botany, Plate 38.

This is a much branched shrub, from three to five or six, sometimes even twelve, feet in height. The tough, flexible, dichotomous branches which come from the bottom of the stem have a horizontal tendency, making the plant look lower than it is; they have a jointed appearance, each joint enlarging upwards, and seeming to have been drawn out from the one below it. Bark grayish yellow, very tough. On the last year's shoots, it is of a greenish or yellowish bronze, with a

pearly lustre. Leaves alternate, two or three inches long, and half as wide, oval or obovate, entire, tapering at each extremity, green and smooth above, pale or whitish and rather downy beneath, on short stalks. The flowers appear in April or May, and fall before the leaves expand. "Previously to their emerging, they exist in miniature within a small hairy bud, which occupies a sheath or cavity in the end of each flowering branch."¹ There are usually three from each bud, with their short footstalks cohering. They are half an inch long, of a pale or greenish white or yellowish color, pendant, lateral, from the midst of the young, unexpanded leaves. The corolla-like calyx is monosepalous, tubular, trumpet-shaped, or bell-shaped, contracted at base and in the middle, enlarging upwards, and ending in an irregularly and slightly toothed border. Stamens eight, alternately longer, conspicuously terminated by ovoid anthers, projecting, on slender filaments, which proceed from the lower part of the tube. Style curved, somewhat longer than the stamens, proceeding from the side of a roundish ovary. Berry small, oval, containing one compressed, ovate seed.

This plant grows in wet, marshy, and shady places from Canada to Georgia. It is conspicuous, when in flower, for the number of its yellow blossoms, which fade and fall rapidly as the leaves expand.

The peculiar properties of the family are remarkable in this plant. The fresh bark produces a sensation of heat in the stomach, and at last brings on vomiting. The wood is very pliable, and the bark of singular tenacity and toughness. It has such strength that a man cannot pull apart so much as covers a branch of half or a third of an inch in diameter. It is used by millers and others for thongs. The aborigines used it as cordage. Its twigs made beautiful baskets.

¹ Bigelow.

FAMILY XIV. THE CROWBERRY FAMILY. *EMPETRA'CEÆ*.
NUTTALL.

This forms a small group of heath-like plants, natives of the northern temperate zone and the southern extremity of South America. It consists of low under-shrubs, with simple, entire, coriaceous leaves, scattered or verticillate, often revolute, without stipules. Flowers in the axils of the upper leaves, sterile, fertile, and perfect, on different or on the same plants, with a calyx of persistent, imbricated scales; stamens equal in number and alternate with the sepals; anthers two-celled, the cells distinct, bursting longitudinally. Ovary three-celled to nine-celled; ovules solitary, ascending; stigma radiating, the number of its rays equal to that of the cells. Fruit fleshy, globular, three- to nine-celled, three- to nine-seeded.

This family was proposed by Mr. Nuttall to contain the *Empetrum* and *Ceratiola*. It includes only these and *Corëma*, and the genus found in this State, — *Oakèsia*. Mr. Nuttall pointed out its distant affinity to *Taxus* among the Coniferæ. The resemblance to the Heaths in appearance and habit is striking.

Little is known of the properties of this family. Linnæus informs us that the fruit of *Empetrum nigrum*, of the north of Europe, is eaten by many animals, and even by man.

Of this family, I believe there is but one plant known in Massachusetts. It is the —

OAKÈSIA. Tuckerman. *Corëma*, Decandolle.

Of which there is one species, —

THE PLYMOUTH CROWBERRY. *Oakèsia Cónradi*. Tuckerman.

First noticed by Mr. Conrad among the pine barrens of New Jersey, and called after that gentleman by Dr. Torrey; separated from *Empetrum*, and called *Tuckermánia*, by Dr.

Klotzch, in honor of Mr. Edward Tuckerman; but named, by the latter, *Oakèsia*, in honor of William Oakes, Esq.

It clothes one open, sunny hill, of some acres, in Plymouth, with a low, brown, uniform dress, strongly reminding one of the description of the heaths of Europe. In the end of March, or the beginning of April, the numerous purple, terminal blossoms, give to this spot an air of gayety, in striking contrast with the sere and melancholy waste everywhere around, when little else, except the beautiful and fragrant May-flower (*Epigæ'a*), gives evidence of the approach of spring. The lovers of nature in this town of the Pilgrims have the pleasure of announcing the agreeable news, by presents of the *Oakèsia* and the *Epigæ'a* to their friends at a distance. A favor of this kind, from my friend Mr. Gilbert, gives me the opportunity of describing this plant.

It rises a foot or two from the ground, forming large, crowded tufts. The stem is small and round, of a reddish color, with an ashy bark. The short branches are in imperfect whorls or stages; their ends are covered with the thickly set leaves, closely scattered, or in whorls of three. Leaves very short, needle-like, so completely revolute at the edge as to form almost a cylinder. Male flowers in terminal bunches of ten to fifteen, consisting of three to six, brown, membranaceous scales, enclosing three stamens. Filaments long threads, supporting on their summit a bi-lobed anther, free at each extremity, and opening longitudinally on the external sides.

The plants bearing the female blossoms have leaves of a lighter green. These flowers also are terminal, in clusters of about twelve. Each flower consists of one ovary, surmounted by a trifid style, encircled by three delicate equal scales, in the axis of one which is ovate, ciliated at the margin, and acuminate. Some plants are found bearing perfect flowers. The stamens and pistils are purple; the encircling scales, brownish.

CHAPTER IV.

MONOPETALOUS PLANTS.

FAMILY XV. THE OLIVE FAMILY. *OLEACEÆ*.

THE Olive, the Lilac, the Ash, and the Privet, with some other less known, but hardly less dissimilar, shrubs and trees, form this family. It is apparently made up of discordant materials; but their analogy in nature is proved, not only by their distinctive characters, but by the fact that all the species are capable of being successfully grafted on each other. The Lilac will graft upon the Ash and the Fringe tree, and the Olive will take on the Phillyrea and even on the Ash itself. — *D C., Prop. Med.*, 206.) The essential character is as follows: —

The plants belonging to it are trees or shrubs with opposite branches, four-cornered or compressed branchlets, opposite, entire, simple, or pinnate leaves, without stipules. The flowers, in terminal or axillary racemes or panicles, perfect, or sometimes wanting stamens or pistil; with a persistent calyx of four parts or divisions; a corolla of four petals, sometimes distinct, sometimes united, rarely altogether wanting; two stamens (sometimes more), and a two-celled ovary with a very short style. The fruit is various. Frequently it is a one-celled, one-seeded drupe, as in the olive; sometimes, a capsule with two valves; sometimes, a winged capsule or key, as in the ash. The plants of this family, chiefly natives of temperate climates, present various claims to the consideration of man: some of them produce durable and elastic wood; others, fruits full of a valuable oil, or important as articles of food: some of them, fragrant and showy flowers; others, medicinal juices.

The bark and leaves of the greater part are bitter and astringent; the bark of the ash, especially, possesses these properties

to such a degree that it has been successfully employed as a substitute for Peruvian bark, in the treatment of fever. From the bark of some species of the flowering ash exudes the mild and useful purgative known by the name of *manna*. The olive is one of a very few plants which yield oil from the fleshy part of their fruit, it being almost universally confined to the kernel or seed. The sap of the ash has some resemblance to that of the maple.

The family is divided into three sections, each of which has a representative, indigenous or introduced, in our forests or gardens:—

1. THE OLIVE TRIBE, — whose fruit is a drupe or berry, comprehending, with the Olive, the Privet, the Phillyrea, and the Fringe Tree, or Snow Flower;

2. THE LILAC TRIBE, — fruit a capsule; containing the Lilac and the Fontanesia;

3. THE ASH TRIBE, — fruit a key; the Ash and the Ornus, or Flowering Ash.

1. THE OLIVE TRIBE. *OLEIFNEÆ*.

The only genus which has become naturalized, is

XV. 1. THE PRIVET. *LIGUSTRUM*. Tournefort.

This genus contains a very few shrubs or low trees, indigenous to the temperate regions of Europe and Central Asia, with opposite, entire, smooth leaves, and flowers in terminal panicles. The calyx is short and four-toothed; the corolla has a short tube, longer than the calyx, with its border four-lobed. Stamens two, with short filaments attached to the tube of the corolla. The ovary is two-celled, with two ovules in each cell, and surmounted by a very short style bearing a two-cleft stigma. The berry is two-celled, with one or two seeds in each cell.

THE COMMON PRIVET OR PRIM. *L. vulgàre.* L.

A hardy shrub, with numerous opposite branches, growing to the height of six or eight feet. It grows in clumps from strong, matted, bright yellow roots. The bark on the trunk is of a dark pearly ash color. The branches are grayish, recent shoots greenish gray, smooth, or with a delicate, silken pubescence. The leaves are small, on very short stalks, crowded in tufts or opposite on the growing shoots, lance-shaped, acute at both ends, entire, pale green and smooth on both surfaces.

Flowers white, in short terminal panicles made up of opposite short branchlets, with a slender bract at base of each, on which the flowers are in opposite pairs. Footstalk very short, white, with a minute white bract beneath; calyx short, ending in four very obtuse teeth; corolla a short tube, with four oblong, expanded, pointed segments. Stamens two, short, growing to the inside of the tube; anthers large, sulphur-colored, soon turning brown; pollen sulphur-colored, fragrant. The berries are of a shining black. In the south of England, the privet is evergreen. Here, the leaves fall, but later than those of most other plants. It is not a native, but was introduced from Europe, and has spread extensively in the eastern part of this State.

The leaves and bark are bitter and astringent. In Belgium, and some other parts of the continent of Europe, the small twigs, clipped in June, dried and powdered, are used in tanning leather. From the berries a rose-color is obtained for tinting maps; and their juice, with the addition of alum, is used to dye wool or silk green. An agreeable oil for culinary purposes and for lamps, or making soap, is obtained from the berries, by a process of grinding and pressure. In France and Great Britain, the privet is much used as a hedge plant, either

alone or with other plants. Its use for this purpose is recommended by the beauty of the foliage, the flowers, and the berries, by its rapid and easy growth, and by the fact that it grows well under the drip of other trees, except evergreens. It flourishes on almost any soil, as may be easily seen from the variety of ground on which it has sown itself in the vicinity of Boston; and it is propagated by seed or by cuttings, and requires very little pruning.

The privet of Nepaul, which in its native climate is a tree, but, as cultivated in Europe, a shrub, is the only other species known.

Several species of *Phillyrea*, and the Virginian Fringe tree, *Chionanthus Virginica*, are cultivated in our gardens for their beauty as ornamental shrubs.

The representative of

2. THE LILAC TRIBE,

THE LILAC, *SYRINGA VULGARIS*,

“ Various in array, now white,
Now sanguine, and her beauteous head now set
With purple spikes pyramidal,”

was one of the first plants introduced by our forefathers, and it is universally found; often, in the front of ancient houses, growing almost to the size of a tree. The more delicate Persian lilac, *S. Persica*, is getting gradually into favor. A variety with smaller leaves and a more delicate appearance has been introduced, called the Italian.

3. THE ASH TRIBE. *FRAXINEÆ*. BARTLING.

Distinguished by having its fruit a single samara or key, contains the genera *Fraxinus* and *Ornus*.

XV. 2. THE ASH. *FRA'XINUS*. Tournefort.

The ashes are lofty trees, with deciduous, compound, unequally pinnate, articulated leaves, axillary and terminal scaly and downy buds, and flowers in lateral, crowded panicles, rising from the axis of the last year's leaves. They are found abundantly in North America, in smaller numbers in Europe and Central Asia, rarely in Eastern Asia.

The flowers are perfect, or wanting stamens or pistils, on distinct plants or on the same plant: usually the two sexes are found on different trees. The calyx and corolla are four-parted or wanting. Stamens two. Ovary free, two-celled. The fruit is a one-seeded samara or key, cylindrical at base, compressed above, and ending in a long, membranous wing. The ashes are usually without a corolla. From this circumstance, the family is properly placed next those which have never a corolla.

The ashes yield to the oaks alone in the number and importance of their uses. The timber of no other tree of Europe or of the United States, equals ashen timber in elasticity; and its hardness and strength, and other valuable properties, are so considerable, that of our species, as of that of England, might be pronounced the eulogium of Spencer:—

“The ash for nothing ill.”

“It serves the soldier,” as Evelyn says (pp. 156, 157), “and heretofore the scholar, who made use of the inner bark to write on, before the invention of paper. The carpenter, wheelwright, and cartwright find it excellent for ploughs, axle-trees, wheel-rings, harrows, bulls; it makes good oars, blocks for pulleys and sheffs (shieves), as seamen name them. For drying her-rings, no wood is like it, and the bark is good for the tanning of nets; and, like the elm, for the same property (of not being

so apt to split and scale), is excellent for tenons and mortices ; also for the cooper, turner, and thatcher ; nothing is like it for our garden palisade-hedges, hop-yards, poles and spars, handles and stocks for tools, spade-trees, &c. In sum, the husbandman cannot be without the ash for his carts, ladders, and other tackling, from the pike to the plough, spear, and bow ; for of ash were they formerly made, and therefore reckoned amongst those woods which, after long tension, has a natural spring, and recovers its position ; so as in peace and war it is a wood in highest request. In short, so useful and profitable is this tree, next to the oak, that every prudent lord of a manor should employ one acre of ground with ash to every twenty acres of other land, since in as many years it would be more worth than the land itself."

There are three species of ash growing in Massachusetts, — the White, the Red, and the Black. The Yellow is found in Maine, and may, perhaps, belong to this State.

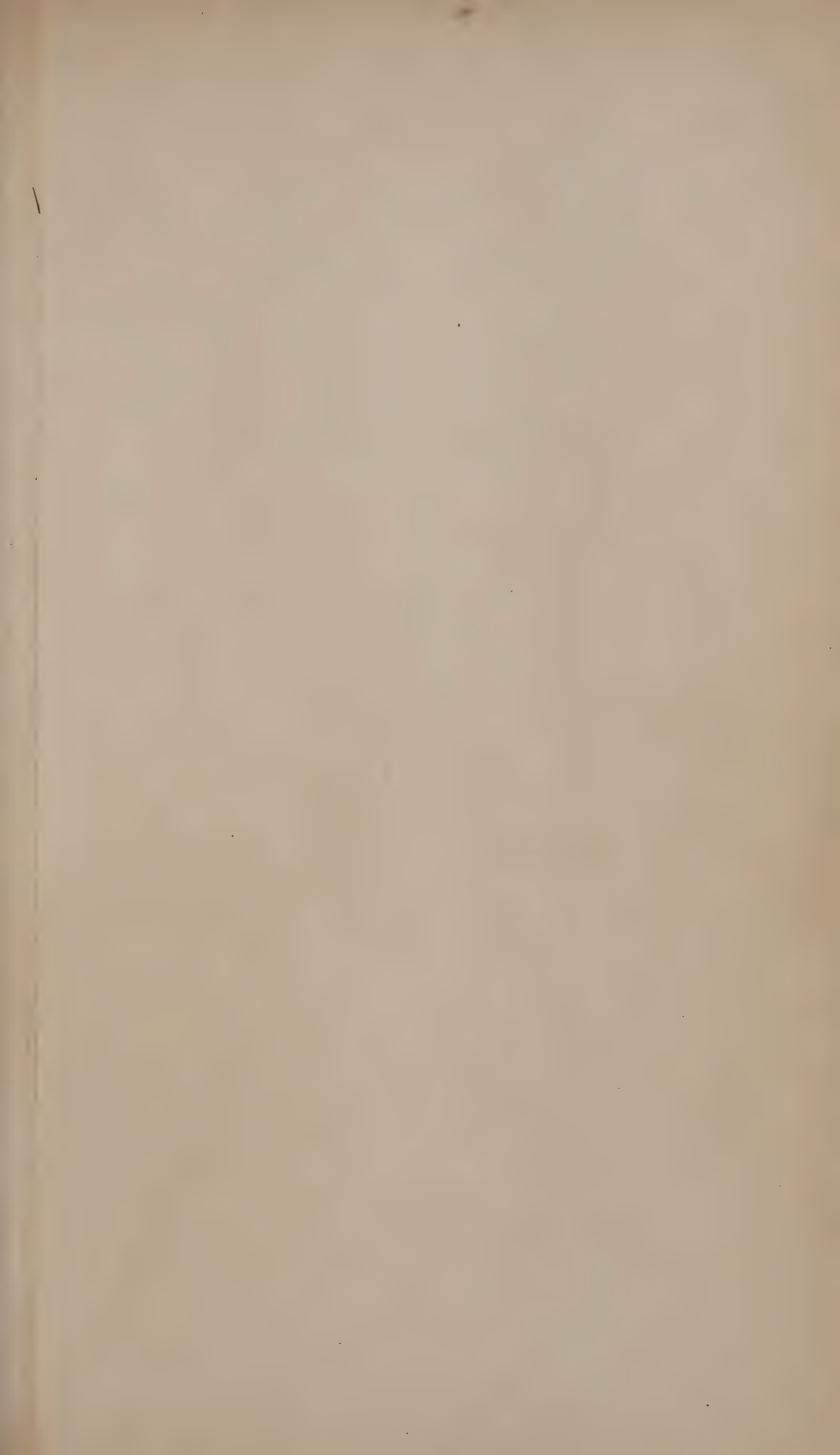
Sp. 1. THE WHITE ASH. *F. acuminata*. Lamarck.

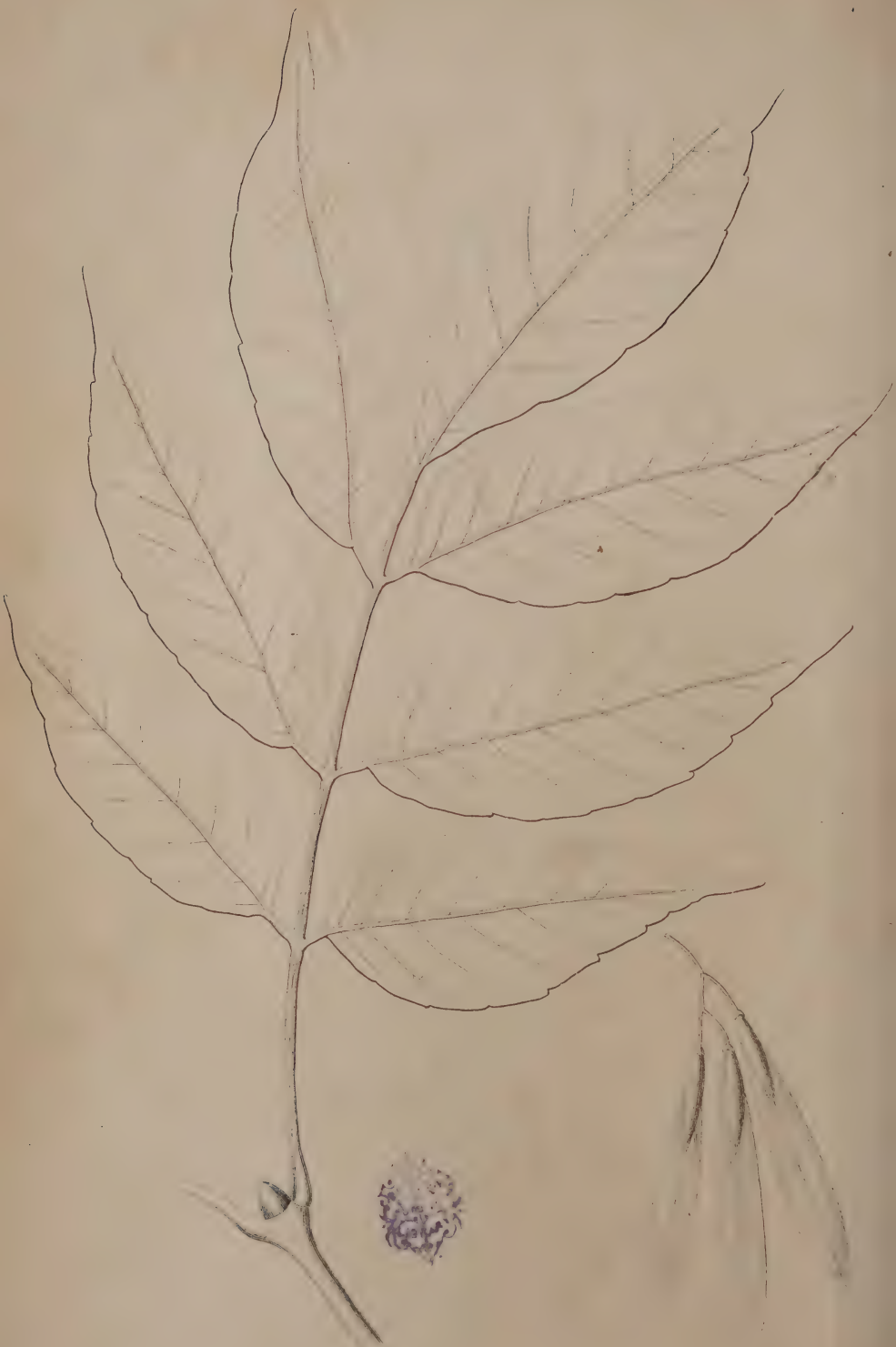
Figured in Michaux, Sylva, III., Plate 118 ; and in our Plate.

The white ash is a graceful tree, rising, in the forest, to the height of seventy or eighty feet, with a straight trunk and a diameter of three feet or more at the base. On an open plain, it throws out its branches with a gentle, double curvature, to a distance on every side, and forms a broad, round head, of great beauty. The trunk is covered with a whitish bark, which, in very young trees, is nearly smooth ; on older trees, it is broken by deep furrows crossing each other obliquely, into irregular, square, or lozenge-shaped plates, and on very old stems becomes smooth again from the rough plates scaling off. The bark of the branches is smooth, of a grayish green, indistinctly dotted with gray ; while, on the somewhat stout young shoots, it is of a smooth, polished, deep green, with long white dots.



A FOREST OF ASHES IN MAINE.





WHITE ASH. (*Fraxinus Americana*.)

The leaves are opposite, compound, twelve or fifteen inches long, the stalks much swollen at base and at the joints, round, smooth, and tapering. The leaflets are usually seven (five to nine), from three to five inches long and one or two broad, on compressed petioles, channelled above, four or five lines long. They vary in form from egg-shaped to lance-shaped, elliptic, oblong, and inversely egg-shaped, tapering to a long point, rather acute at base, entire or slightly dentate, or serrate, smooth above, very pale or glaucous, and somewhat hairy along the veins beneath. The odd leaflet is on a long stalk. The young leaves are very downy, but become almost perfectly smooth. The buds are short and rust-colored, smooth; terminal buds, large.

The flowers are in opposite fascicles or bunches, near the ends of the branches, in the axils of the last year's leaves. The fertile flowers are on a smooth, branched, tapering, purplish rachis, with opposite branches; each branch terminating in a flower. Calyx deeply two-parted, the parts divided slightly. Ovary flattened, elliptic; style tapering; stigma bifid. The footstalks have two opposite scales, like bud-scales, near the base, and beneath each ramification. In the fertile flowers, the two sterile stamens, when present, are opposite, at the base of the ovary. The staminate are in close, dense, much-branched fascicles, which fall off after shedding the pollen; but on some trees many of the clusters are not developed, but remain as unsightly excrescences near the end of the branches. At the end of each very short branch, in a flat cup with four teeth, are two sessile or nearly sessile brown stamens, parallel, and one-eighth to one-fourth of an inch long. The keys or samaræ are on angular, tapering, diverging stalks, dividing by threes, and from five to seven inches long. The keys are one and a half inches long, cylindrical at the base, which is surrounded by the minute, jagged calyx, and expanding upwards into a flattened wing, two or three lines broad, rounded or rarely notched at the extremity.

The flowers appear in May, before the opening of the leaves, and the keys are mature in August and September, about which time the leaves turn to an olive or olive purple. The keys often remain on the tree through the winter.

The white ash is found in every part of the State and on every kind of ground ; but flourishes best in a deep, loamy soil, near the banks of a river or in a moist meadow. "By the banks of sweet and crystal rivers and streams," like the English ash, it is observed to thrive infinitely. It is sometimes seen nestling among rocks, where it can hardly get foothold, and is frequent on the steep sides of the Hoosic mountains. In swamps, it gives place to the black ash. In the old forests, in the narrow valleys in the western part of the State, it towers to a great height. Not unfrequently, it may be found one hundred feet high and more, with a diameter of four feet and upwards. Sixteen years ago, an ash was felled in Granville which was riven into three thousand rake-stalks. It was four and a half feet in diameter, and had a shaft of seventy feet without a limb. It grew on the land of Zelotes Robinson, now of Blandford. Standing by itself, the ash rarely attains a great height. There is, growing at the corner where the road from Hingham Plain to Cohasset unites with that from the Old Colony House, an ancient tree, which measured, in July, 1839, four feet two inches through, at four and a half feet from the ground, and four feet eight inches just below the branches. At seven or nine feet from the surface, ten large branches go off, horizontally, or with a slight inclination upwards, forming a broad space above them, on which seats have been placed.

The ash has been called the painter's tree. It is, at least while young, remarkable for its gracefulness, for the light and easy sweep of its branches, and for the softness and mellow green of its foliage. It produces a fine effect in contrast with the darker woods, and should, on that account, always have a place where it is the object to exhibit the various beauty of

the forest trees. Its leaf comes out late, and, although beautiful while it lasts, and turning to a rich, mellow, olive purple, for some time before it falls, it falls early. It should not often, therefore, stand alone, in a conspicuous place, but in a corner among other trees.

The wood is white, and remarkable for its toughness and elasticity. For these qualities, it is used for hoops, for handles of pitch-forks and rakes, and for the shafts and springs of wagons and other carriages. It is used to make oars, in preference to any other wood. The oars, already made, are brought to Boston, from the Penobscot and Kennebec Rivers, in Maine. They are made of forest ash, which is considered lighter and more springy than any other. It is also used for ship's blocks, for which purpose it is wrought in a green state, as it is then almost as soft as pine. It is used for the boxes of pumps, almost exclusively. White ash from Maine is used, for its superior softness, for the bodies, brackets, sills, and pillars of carriages; a tougher variety, from the interior or from the west, being preferred for shafts, springs, and bars, requiring strength. Lance-wood alone, as more elastic and strong than ash, is preferred for carriage shafts. Ash is also used for sofa frames and chair frames, for backs and bottoms, for staves for inferior casks intended for dry articles, and for bowls.

The leaves and branches of the ash are said to be so offensive and perhaps poisonous to serpents, that they will not come nigh them. William D. Williamson (*History of Maine*, I., 166), says: "It is said that a venomous serpent will not cross its leaves, and that these and the bark are an antidote to poison." The leaf is also said to give relief in case of a bite from poisonous serpents. This property is of small consequence in New England, where poisonous serpents are few, and probably confined to the single species of the rattlesnake. A more important property has been tested. An ash-leaf, rubbed upon the swellings caused by mosquitoes, removes the

itching and soreness immediately. The same effect is produced on the poison occasioned by the bite of the bee. A decoction of the leaves is said to be an antidote to the poison of lamb-kill, *Kalmia angustifolia*, when taken by lambs.

Sp. 2. THE RED ASH. *F. pubescens*. Walter.

Figured in Michaux, Sylva, III., Plâté 119.

In its appearance, the red ash so strongly resembles the white that it is usually confounded with it. It is easily distinguished by the down on the recent branches, and on the footstalks and lower surface of the leaves. The distinction is important, as the wood is less valuable than that of the white. It is found in nearly the same situations; delighting in a moist, rich, loamy soil, where it grows to a good size, though never to so great a height as the white ash. On the rich intervale land on the Connecticut River and its tributaries, it is often found over three feet in diameter, and fifty or sixty feet high. A few rods south of the great *Celtis*, in Springfield, I measured one in September, 1840, which was ten feet four inches in circumference at the surface, and nine feet at three feet above. The red ash is a spreading, broad-headed tree, and rises to a considerable height only in the forest. The trunk is erect and branching, covered with a dark ashy or granite gray bark, with numerous longitudinal, superficial furrows, not often running into each other.

The branches are opposite, grayish, conspicuously dotted, the younger ones green, or olive green; and the recent shoots, with the footstalks and under surface of the leaves, clothed with a soft, velvety, grayish or rusty down.

The last year's shoots are somewhat downy in appearance, but not in reality. Near their extremity, in the axils of the last year's leaves, are the flower branches. They are, when the fruit is mature, three or four inches long, single, or in threes, dividing by nearly opposite divisions, and subdividing;

the subdivisions bearing at intervals single or double pairs of fruit or keys, on short, thread-like stems. The keys are one and a half or two inches long, and two or three lines broad, cylindrical below, broader, flat and thin above, rounded and with sometimes an abrupt point at the extremity. Closely adhering to the base is the slit calyx, ending in four jagged teeth.

The leaves are opposite, ten to fifteen inches long, consisting of three or four pairs of leaflets and an odd one, on a round footstalk, which is channelled above and swollen at the base and at the articulations of the leaflets. The leaflets are three to six inches long and one to one and a half wide, on very short, compressed, downy footstalks, generally ovate-lance-shaped, acute or rounded at base, tapering to a long point, entire or obscurely toothed above, entire below, the upper surface smooth or somewhat hairy, the under surface paler and somewhat downy. The buds are rounded, almost concealed by the leaf-stalk, downy, and of a dark rusty brown. In autumn, the leaves become russet. The fruit remains after the leaves have fallen, and, on the male trees, as is common on the other ashes, there are unsightly excrescences from the sterile blossoms.

Sp. 3. THE BLACK ASH. *F. sambucifolia*. Willdenow.

Figured in Michaux, Sylva, III., Plate 122.

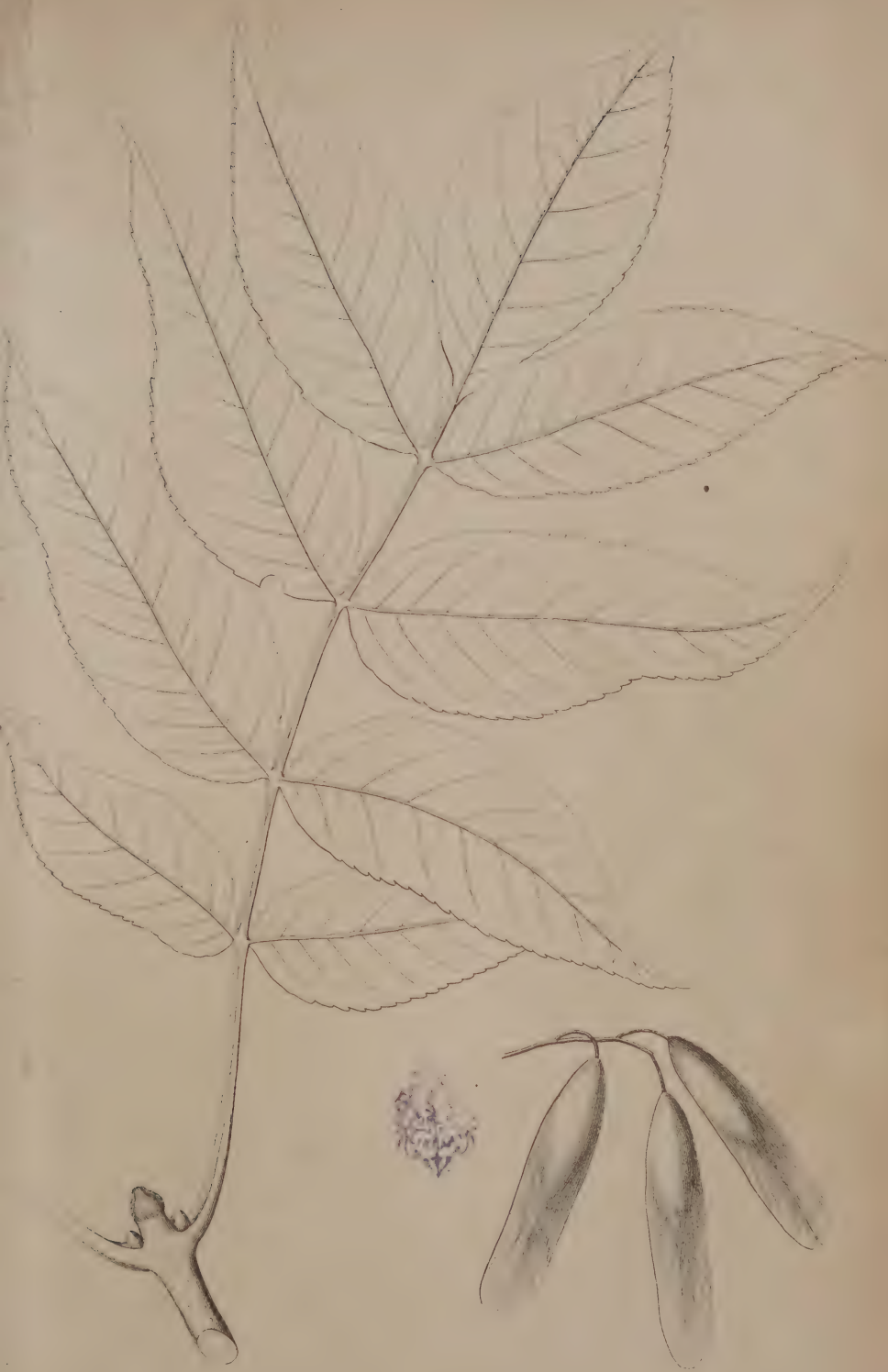
The black ash is the slenderest deciduous tree, of any considerable magnitude, to be found in the forest, often attaining the height of seventy or eighty feet with a diameter scarcely over a foot. It is almost confined to swamps or the muddy banks of rivers, where the ground is saturated with moisture through the greater part of the year. In such situations, it often throws up its arrowy shaft, almost without a limb, until its top reaches the sunshine, among the tall hemlocks, spruces, haematacks, birches, and maples. Yet, when planted on an open plain,

where the soil is rich and not too dry, it spreads abroad its limbs, and forms an ample, round head. It is easily distinguished from the other ashes by its *sessile*, serrate leaves, and its dark blue or black buds, and not by the color of the bark, in which there is not a striking difference. The trunk is of a dark granite gray, the bark rough, with small, superficial, vertical rugosities, which appearance continues in very old trees.

The young shoots, which are very stout, are of a yellowish ashy gray, dotted with lighter dots, and next year becoming of a clear gray, somewhat darker on the older branches; on which, the dots have the appearance of large warts. The semi-circular leaf-scars are large and conspicuous on the smaller branches. The leaves, which come out late and fall early, are of a yellowish green, twelve or fourteen inches long, opposite, compound, with two to five pairs of leaflets, usually four pairs and an odd one, on a leafstalk, which is large at the base, somewhat flattened below the leaflets, and flattened or channelled above with a sharp-edged channel. The lateral leaflets are sessile, narrow, ovate-lance-shaped or oblong, rounded at base, gradually tapering to a long point, serrate, smooth but impressed at the veins above, paler and hairy along the lower part of the mid-rib beneath. The terminal one is regularly lance-shaped, on a short footstalk. The buds are short and round, terminating in a point, and of a deep blue or black color.

The flower branches are opposite, single or in threes, in the axils of the last year's leaves. They are from three to six inches long, dividing irregularly, and not much branched. The flowers differ from those of the other ashes in the absence of a calyx. The keys are a little more than an inch long, elliptic, obtuse or slightly notched at the end, which is sometimes surmounted by the style, compressed and winged throughout. They are mature in September or October. In autumn, the leaves become russet.

The wood of the black ash is remarkable for its toughness. On this account it was preferred to every other, by the Indians,



BLACK ASH. (*Fraxinus sambucifolia*.)

for the manufacture of baskets; and is still used for that purpose in preference to every kind of wood, except that of the trunk of a young white oak. When it is to be divided, it is beaten with mallets until the fibres are somewhat loosened; and it may be then separated into thin, uniform ribbons of any required dimensions. It is also somewhat used, and was formerly much more so, for chair-bottoms and grain-riddles, and for hoops. Its sap, procured by exposing a green branch to the fire, is a popular application for ear-ache.

Of the other ashes that would flourish in our climate, the most valuable, doubtless, is the common European Ash (*F. excelsior*). This has been introduced, and found to grow as readily and as vigorously as any of the native species. It is considered, in England, as among the noblest and most beautiful of the forest trees, and next to the oak in the value of its timber. In Italy, it grows rapidly to 100 feet. It is cut to most advantage at 100 or 120 years' growth, but lives to 180 and over. The wood, hard and tough, is used for every thing exposed to rubbing. The wens or knuckles are much used by the turner. In the neighborhood of London, the plants, at two years from the seed, may be procured at 3s. per 1000; transplanted plants, one foot or more in height, at 10s. (about \$2.50) per 1000. Some of the many varieties, particularly the weeping ash, are prized for their beauty.

The green ash may hereafter be found in Massachusetts, as it occurs in Canada. There are many other ash trees, probably thirty; but these are the best.

FAMILY XVI. THE HOLLY FAMILY. *AQUIFOLIACEÆ*.

DE CANDOLLE.

This consists of evergreen or deciduous shrubs or trees, with alternate or opposite leaves which are often smooth and coriaceous, and small, solitary or fascicled perfect flowers, or flowers wanting stamens or pistil, growing from the axils of the leaves.

The calyx and corolla are imbricate in the bud before opening. The calyx has four or six divisions; the corolla, four to six lobes, united at their base, and there are as many stamens, inserted into it and alternate with its lobes. The ovary has two, six, or eight cells, with a pendulous ovule in each. The fruit is fleshy, and opens not spontaneously, with from two to six stones, each containing a pendulous seed.

The plants of this family are found in various parts of the world; three genera only in New England. Several of them have valuable properties. The bark and leaves of the European holly have been found efficacious in intermittent fevers. The famous Jesuits' tea of Paraguay is made of the leaves of another species of holly. Five millions of pounds are annually produced in that country. An inferior tea is made from another species in Brazil. The aborigines of the Southern States made great use of the infusion of a species of holly as a purifier of the system, and of that made from another plant of this family as an agreeable stimulant. The properties of a species of winter berry will be spoken of hereafter. Many of the species are favorites with the gardener, for their brilliant, evergreen foliage.

XVI. 1. THE HOLLY. *ILEX*. L.

The hollies are evergreen shrubs or small trees, with leaves usually coriaceous, and often bordered with thorny teeth; and white, axillary flowers, commonly perfect, but often with the

fertile and sterile on different plants. They are distinguished by their four-celled ovary, with four sessile stigmas; and their berry-like drupe, with four one-seeded nuts. The hollies are found in North and tropical America, in the warmer parts of Asia, and a single species in central and north-western Europe. Their wood is remarkable for its hardness, whiteness, and closeness of grain, and for its susceptibility of receiving color and polish. There are about forty species in the genus.

THE AMERICAN HOLLY. *I. opàca*. Aiton.

Figured in Michaux, Sylva, II., Plate 84.

The American holly is a handsome, low tree, with nearly horizontal branches, and thorny, evergreen leaves. The erect trunk is clothed with a smooth bark, of an ashy gray, resembling that of the beech, but somewhat lighter. On the older trees, it is usually overspread with grayish parmelias and lecanoras, and other bluish, whitish, and gray lichens. The recent shoots are of a yellowish or olive gray, with a slight, downy powder, afterwards becoming of a clear gray. It is found growing in company with the red maple, the tupelo, the yellow birch, the black oak, and the cedar.

Leaves on short footstalks, evergreen, oval-oblong or elliptic, acute at both ends, or somewhat angled at base, with several large teeth ending in stiff spines, leathery, smooth, and shining above, paler or greenish yellow, with bright green veins, beneath. At their base, when recent, a pair of awl-shaped, brown stipules may be seen.

The perfect or fertile flowers are solitary, at the base of the recent shoots, on stems half an inch long, beneath the base of which are a lanceolate, membranous, brown, fugacious scale, and two minute, pointed, more permanent ones at its sides; and above the middle are two appressed, minute, pointed, green scales. The calyx has four triangular, pointed, ciliate

teeth. The corolla, four oblong, roundish, white segments, with greenish veins. The stamens are four, from the base of the corolla, between its segments, and two-thirds as long. The ovary is large, egg-shaped, green, crowded with a sessile stigma, with four rounded angles. The berries are scarlet, contain four stony seeds or nuts, and remain on the tree into the winter. It flowers in June.

This tree is found plentifully at Quincy, at Cohasset, and especially at New Bedford, and on Naushon Island. It has considerable beauty, and is particularly valuable for retaining its bright green leaves through the year, and for the beauty of its scarlet berries. The leaves are seldom touched by an insect. On these accounts, it deserves cultivation as an ornamental tree. It has great resemblance to the European holly, which makes the most durable hedge of any plant whatever, and one which is kept in repair, when once established, at the least expense. The objection to it is the slowness of its growth. Our tree is commonly found on a rather dry, sandy, or rocky soil, but will grow on almost any. The European is found to do best on a rich, sandy loam, in an open forest of oak. It is propagated by seeds or by plants taken from the woods. The seeds do not germinate for more than a year after sowing; they are, therefore, kept in moist earth for a year after gathering, after which they are sown at the depth of a quarter of an inch, in fine soil. The surface should be protected from heat and drought, by a covering of half-rotten leaves or litter. When transplanted, they should still be protected, for a while, from the heat of the sun. The best time for transplanting is early in spring, before the plant has begun to shoot.

The wood of the holly is compact and of a beautifully close grain and satiny texture. The sap-wood is white, the heart-wood brown. Both are very hard, when seasoned, and susceptible of a brilliant polish, in their natural state, and when colored; and are used in as great quantities as can be pro-



page 161

Armstrong & Co. Lith. 166 Congress St Boston

- 1 MOUNTAIN HOLLY. (*Nemopanthus Canadensis*.)
- 2 AMERICAN HOLLY. (*Ilex opaca*.)

cured, by turners, by screw-makers, by whip-makers for the handles of whips, by engravers, and by cabinet-makers for inlaid work. For these various uses the wood is brought into Boston, in pieces usually fifteen or sixteen inches long, and from one to six inches thick.

From the bark of the European species bird-lime is made; and the berries of our species, as well as of some others, have emetic properties.

The American holly has not been found farther north than Massachusetts. By Michaux it had not been observed north of Long Island. It is found in all the Southern States, and westward as far as Tennessee.

Seven or eight other species are also found growing in the southern part of the United States.

XVI. 2. WILD HOLLY. *NEMOPANTHUS*.¹ Rafinesque.

A genus of a single species, with sterile, fertile, and perfect flowers on the same or on distinct plants; a very minute, four (or five) toothed calyx; a corolla of four (or five) distinct, oblong-linear, fugacious petals; stamens four or five, longer than the corolla, and alternating with its petals; ovary hemispherical, with four cells; style none, stigma four-lobed; fruit a round, four-seeded berry.

THE WILD HOLLY. MOUNTAIN HOLLY. *N. Canadensis*.
Michaux.

A beautiful, slender shrub, rising to the height of six or eight feet, and in swamps sometimes to ten or twelve. The recent shoots are purple or olive, with round, gray dots, which,

¹ Rafinesque, in "Silliman's Journal," proposes the name *Nemopanthus*, which, he says, means "flower with a filiform peduncle," for this new genus. His name should be retained, as he wrote it, if at all; and his generic description, which was communicated in January, 1818, has priority to Professor Dewey's, which was only suggested, according to Professor Eaton, in that year. — *Eaton's Manual*, p. 403, note.

after the second year, are scarcely to be perceived. The larger branches are greenish gray, growing darker and purplish, and finally, on the older stems, covered with various, white, gray and brown, membranous lichens. The leaves vary in shape, from a short, broad oval, to oblong, and inversely lance-shaped, tapering at the base, acute at the end, or rounded with an abrupt point, very smooth and entire, or with a few distant serratures, of a light green above, paler and finely reticulated beneath.

The flowers are very small, on long, slender, thread-like stalks, solitary or in bunches, at the base of a tuft of leaves or a young branch. The calyx is so small that it seems to be wanting. The corolla consists of four oblong, narrow petals, of pale white, which soon fall. The four stamens alternate with the petals, with rather large anthers on long, slender filaments. The berry is as large as a pea, of a beautiful pale crimson color, ripe in August, and contains four, somewhat prismatic, stony nuts, in a yellowish pulp. It is supported by a stalk of the same color, an inch or more long. The flowers expand in May and June.

The *Nemopanthus* is found in almost all the low, wet woods in the vicinity of Boston and on the southern side of Massachusetts Bay, and in the middle of the State. It is found in Canada, throughout New England, and in New York and Michigan.

XVI. 3. THE WINTER BERRY. *PRINOS*. L.

The winter berry is a genus of twelve or thirteen species of shrubs, some of them evergreen, some deciduous, natives of North America. They differ from the two preceding genera in having their calyx and corolla usually six-parted, with six stamens, and a berry with six seeds. Some of the most beautiful are natives of Massachusetts, and these, with a few others, are cultivated in Europe as ornamental shrubs. The three



WINTER BERRY. (*Prinos . verticillatus*)

found here are the Black Alder, *P. verticillatus*, with flowers and fruit in clusters in the axils of the leaves ; the Single Berry Black Alder, *P. lævigatus*, with its flowers and fruits larger and solitary ; and the Ink Berry, *P. gläber*, with evergreen leaves.

Sp. 1. THE BLACK ALDER. *P. verticillatus*. L.

Figured in Bigelow's Medical Botany, Plate 56.

A handsome shrub, five or six, rarely ten or twelve, feet high, with crowded branches and leaves, conspicuous for its bunches of axillary blossoms, and of scarlet berries, remaining late in the autumn, or even into the winter. The recent shoots are clothed with an apple-green bark, which, on the large branches, turns to a pearly gray, and on the older stems is of a polished and clouded dark color, whence the plant derives its common name. The leaves are two or three inches long and half as broad, lance-shaped, oval, or inversely egg-shaped, acute at both ends, often abruptly at the extremity, sharply serrate, smooth above, downy along the prominent veins beneath, on footstalks half an inch long. The flowers are white ; the stamen-bearing, in crowded bunches, of from three to twelve in the axils of the leaves, on stems one or two lines long, with minute brown scales at the base. The calyx consists of six small, appressed, rounded or jagged segments. The corolla is of one piece, wheel-shaped, ending in six or seven rounded, spreading, or recurved segments ; just below the angles of which, within the tube, are the short stamens, with large brown anthers opening at the sides and discharging orange pollen. On the fertile flowers, which are single or crowded, on very short stems, the stamens are very short, and the false anthers are white and form a part of the filament. The berries are of a bright glossy scarlet, round, or slightly compressed, about a quarter of an inch in diameter, solitary, or in bunches of two or three, and remain long on the bush. The

persistent calyx, at the base, is of a darker color, and the stigma, which crowns the berry, is brown. The pulp is yellowish, and envelops six or eight lunate seeds. The flowers expand in June. The berries are ripe in September, and, with the rich red leaves long remain a conspicuous ornament of the edges of moist woods.

The bark and berries of the black alder are somewhat bitter and astringent, and have been sometimes substituted for Peruvian bark in the treatment of intermittent fevers. The bark has also been considered of great use, both taken internally, and employed as a wash, in cases of incipient gangrene and in the cure of eruptions on the skin. — See *Bigelow's Med. Bot.*, III., 141.

Sp. 2. THE SINGLE BERRY BLACK ALDER. *P. lævigatus*.
Pursh.

Leaves and fruit figured in Abbott's *Insects of Georgia*, II., Plate 86.

A beautiful shrub, six, eight, or ten feet high, with grayish branches, scattered with minute dots of the same color, and a smooth, alder-like trunk with brownish green bark, clouded at intervals with light gray lichens. Leaves in tufts, or alternate on the upper shoots, on short petioles, lanceolate or broader towards the extremity, acute at both ends, often with a twisted acumination, margin slightly revolute, with a few appressed serratures, light green and shining on both surfaces, smooth, except a slight pubescence along the nerves beneath, from one and a half to two and a half inches long, and one half to three quarters of an inch wide.

The stamiferous flowers are on footstalks from one third of an inch to one inch in length, in the axils of the leaves or bud scales; fertile flowers on very short footstalks, in the axils of the leaves. The fruit, which remains on the stem during a great portion of the winter, is of a rich orange scarlet. It is

solitary, three or four tenths of an inch thick, on stems as long as its diameter. The buds are very small.

This plant grows in deep, wet swamps, in Cambridge, and many other parts of the State, and is attractive in June from the multitude of its white flowers, in autumn and winter from its large scarlet berries, and at all times from the glossy lustre of its leaves.

Sp. 3. THE INK BERRY. *P. glàber*. L.

Leaves and fruit figured in Abbott's Insects, I., Plate 35.

An elegant, delicate-looking, evergreen shrub, with slender branches, growing in a few sheltered places in Plymouth and Hingham, to the height of from two to eight or nine feet.

The leaves are lance-shaped or inversely lance-shaped, an inch or more long, one third or one half an inch broad, tapering at base, terminating in an abrupt point; slightly reflexed at the margin, with one or two large, rounded teeth on each side towards the end, polished on both surfaces.

The flowers are solitary, in the axils of the leaves, on thread-like, minutely hairy stalks, half an inch long. The calyx ends in six obtusely pointed lobes; the corolla, in six or seven oblong, rounded segments, alternate with which are the white stamens, ending in brown anthers. Ovary green, low, conical, crowned with a broad stigma.

The elegance of the evergreen foliage causes it to be much sought after, to be mingled with bouquets in winter; and for this purpose it is brought from considerable distances, and carefully kept in cellars sometimes for months. Of late, it is much cultivated.

FAMILY XVII. THE MADDER FAMILY, *RUBIACEÆ*.

JUSSIEU.

This is a very extensive family, comprehending nearly two thousand species of trees, shrubs and herbs, with roundish or four-sided stems and branches, entire leaves, opposite or in whorls, with stipules between the leaves, often resembling leaves, and with regular flowers.

This family is divided into many sub-orders and tribes, and, with the exception of that (*Stellatæ*) which includes the Madder, *Rubia*, and the Cleavers, *Galium*, which is made a separate family by some writers, is a remarkably natural one. It is mostly confined to countries within or near the tropics, a few species only occurring far to the north. The properties of different plants of this family are of the greatest importance. Madder, and several species of *Galium* yield valuable dyes and pigments. The roots of Dyers' Cleavers, *G. tinctorium*, were employed by the North American Indians to give to the quills of the porcupine a red color, which neither sun, air, nor water would change. The seeds of some species of the same genus are a successful substitute for coffee. The Peruvian bark (*kin-kina*, "the bark of barks"), the best febrifuge known, is obtained from several species of *Cinchona*, natives of Peru, which possess, in very various degrees, the bitter, astringent, and alkaline properties which give them their virtue. *Pinckneya pubens*, the fever bark of Carolina, is reputed to have properties similar to *Cinchona*. Coffee is the horny, albuminous seed of *Coffea Arabica*, the best known and most important species of a numerous group. All the different kinds of coffee known in commerce are varieties of this one species, originally brought from Mocha, or, according to Raynal, from the mountains of Abyssinia, of which it is a

•

native, and from which it was transported, about the middle of the fifteenth century, to the mountains of the Happy Arabia.

The East India coffee plantations are derived from a single plant raised in Batavia, from seed introduced from Mocha in 1690; and those of the West Indies are said to have been produced also from a single plant, presented, in 1714, by the Dutch, to Louis XIV. This was multiplied in the Royal Gardens, whence three plants were despatched on board a ship destined for Martinique. Two of them perished in the long and dangerous passage, and the third was kept alive only through the self-sacrificing generosity of the Captain Declieux, who shared with it his allowance of water. Probably the propagation of no single plant has produced, in modern times, so great an effect upon the habits of mankind:¹

Ipecac, one of the most universal emetics, is the creeping, brownish, or grayish root of *Cephaelis Ipecacuanha* (D. C., IV., 535), of Brazil, where it is known by the name of *Poyas*.

Several of the genera, *Nauclea* and *Hymenodyction*, furnish woods which vie with box and mahogany in delicacy and beauty; of another, *Siderodendron*,—iron wood, the hardest of American woods, is the produce. Several others yield valuable fruits, and a still greater number are remarkable for their magnificent and often odoriferous flowers, and their beautiful foliage.

The coloring properties of this family are found to reside chiefly in the root; the tonic and astringent properties, in the bark; the valuable emetic principle, in the root; the aromatic principle of the coffee, in the horny seeds. It is in corresponding parts of plants of this family, growing among ourselves, that we are to look for similar properties.

The distinguishing characters of the family are that the ovary is more or less completely united with the four or five-

¹ The name affords a curious instance of derivation. The Arabic name is *Quahoueh*, or *Kahoueh*; the Persian, *Cahwa*; the Turkish, *Cahwey*; French, *Café*; English, *Coffee*.

cleft calyx, into the tube of which the corolla is inserted ; the stamens are equal in number to the lobes of the corolla, alternate with them, and growing from the throat of the corolla ; and that the ovary has, in some of the tribes, one, or rarely two, ovaries, in others several.

In this family there are two genera belonging to Massachusetts : —

Button Bush, *Cephaláanthus*, with flowers in a globose head ;

Partridge Berry, *Mitchella*, flowers terminal, in twos, on a double ovary.

In the sub-order, *Cinchoneæ*, the third sub-tribe, in the division of Torrey and Gray, is

CEPHALA'NTHEÆ, — distinguished by its flowers and fruit being sessile and densely aggregated on a globose receptacle, the fruit dry and divisible into two or four parts.

XVII. 1. BUTTON BUSH. *CEPHALA'NTHUS*. L.

American shrubs, with oval or lanceolate, opposite or ternate, leaves, short stipules, and flowers crowded on a globular, hairy receptacle, with a calyx tube in the shape of an inverted pyramid, the border four-toothed, a tubular, four-cleft corolla, four stamens, fruit inversely pyramidal, leathery, two- to four-celled, separating from the base to the summit into two to four, closed, one-seeded portions.

THE BUTTON BUSH. RIVER BUSH. *C. occidentális*. L.

Figured in Barton's Flora, III., Plate 91, and in our Plate.

The button bush is found along the banks of slow streams, forming little islets in muddy ponds, and in other situations in which its roots and the lower part of its stem are immersed in water for a considerable portion of the year. From stout, contorted roots, often several inches in diameter, and from large, prostrate, root-like trunks, it rises with an erect or sinuous



BUTTON BUSH. (*Cephalanthus occidentalis*.)

stem, to the height of from four to ten feet. On the recent shoots the bark is of a bright, polished, copper color, or olive green, or reddish bronze, with a few brown dots, and turns gradually to a light brown. Afterwards it begins to crack, and, from brown or purplish, turns to a dark granite gray. The bark on the older stems is cracked, rough, and gray, and often covered with lichens. The recent shoots are tough; the pith, considerable; the older wood, light and brittle.

The leaves are opposite, or in threes, of a broad-oval or lanceolate or ovate shape, very entire, acute at base, pointed at the extremity, sometimes wavy at the border, smooth on both surfaces, of a bright, shining green above, light and much reticulate, and sometimes downy on the veins, beneath; and tough and leathery in texture. They are from three to five inches in length, of somewhat more than half that breadth, and are on stout, channelled, or bordered footstalks, from half an inch to an inch long. Between the footstalks are small, faded stipules, which leave a slight scar when removed.

The globular heads of flowers are on round stalks from one inch to three inches long, terminal, or in the axils of the upper leaves, and hence solitary, or in twos or threes or fours, on the ends of the branches; or, as the leaves of the upper whorl are sometimes very minute, they appear in terminal sevens. The flowers appear in June and July, sometimes in August, of a yellowish white, bristling with the long styles, and, as they are closely arranged on every side of a small, terminal, globular, fleshy receptacle, they form a spherical head, each flower being compressed into the shape of a four-sided, inverted pyramid. The calyx is short, green, tubular, externally invested with long, silken hairs, is angular from compression, and ends in four rounded lobes. The corolla, when freshly opened, is of a delicate white, but soon turns brown. It is a slender, tapering tube, hairy within, twice as long as the calyx, ending in four, rounded segments, with black points, on short

footstalks, at the angles, just within which are the anthers, resting erect on the ends of filaments which are attached to the tube of the corolla within. The style is twice as long as the corolla, tapering, and ending in an ovate stigma.

“ Button bush, or river bush, is a frequent ornament of the water side, its insulated thickets furnishing a safe retreat for the nests of the blackbird (*Oriolus phæniceus*).” “ The appearance of this shrub, on elevated ground, often indicates the presence of springs of water.” — *Bigelow Fl.*, 51. It is cultivated in Europe for ornament, recommending itself by its singular mode of flowering, and by its flowers appearing at a season when few others are to be seen. It grows well in common garden soil, in situations moderately moist, and is readily propagated by seeds, by cuttings, or by layers.

The characteristic properties of the family, particularly its tonic power, undoubtedly reside in this plant. The inner bark of the root, according to Elliot, is of an agreeable bitter, and is often used, in the South, as a remedy for obstinate coughs. It has been recommended in affections of the skin. Other properties will probably be discovered.

To another tribe, belongs a singular New England plant, named in honor of Dr. John Mitchell, a botanist of Virginia, —

XVII. 2. PARTRIDGE BERRY. *MITCHELLA*. L.

A genus including two species of smooth, creeping, ever-green plants, with opposite, ovate or rounded, short-stemmed leaves, and axillary or terminal flowers, which, in one species, are solitary, in the other, in pairs, with their ovaries united. The border of the calyx is conspicuous, four-toothed; the corolla funnel-shaped, with a slender tube four-lobed in the border; four stamens, attached to the tube of the corolla; ovary four-celled, surmounted by a slender, long style, bearing four stigmas; fruit a berry, in one species round, in the other oblate-globose, with four, one-seeded nuts.

THE PARTRIDGE BERRY. CREEPING MITCHELLA.

M. repens. L.

Figured in Barton's Flora, III., Plate 95.

A beautiful little creeping, evergreen plant, with its stem trailing along the ground about the foot of trees, in deep, shady, moist woods, in company, oftentimes, with *Gaultheria*, and the equally beautiful *Linnaea* which it so much resembles. At distances, it throws down hair-like roots; its terminal branches slightly ascending, and with the pairs of roundish leaves, almost completely covering the ground, and forming a carpet, enamelled in spring with the pearly, rose-colored, fragrant twin-flowers, and in autumn with its own bright scarlet berries. The leaves are in twos, on short stalks, about the size of the finger nail, roundish, often orbicular, kidney-shaped at base, rounded at the end, with the veins prominent, of a uniform dark green above, or variegated with a lighter spot and whitish veins; the margin somewhat revolute; under surface perfectly smooth.

The flowers are rose-colored, or white, in pairs, the tubes of the corollas, hairy within, diverging from the united ovaries. The fruit, as large as a whortleberry, broader than it is long, and seeming to be made of two berries grown together, side by side, and crowned with their calyxes, scarlet, with a rather dry, whitish, almost tasteless pulp, containing three or four, small, flattened, lens-like, stony seeds. Flowers in June and July. The fruit remains on through the winter, and contributes to furnish food for the partridge, and other birds that remain in our climate.

FAMILY XVIII. THE HONEYSUCKLE FAMILY. *CAPRIFOLIACEÆ*. JUSSIEU.

This family consists of climbing, trailing, or erect, woody shrubs or under-shrubs, and sometimes herbaceous plants, remarkable for their beauty, and some of them much valued, and universally cultivated for ornament. These often fragrant, always beautiful plants, of which there are about eighty species, are natives of the northern parts of both continents, beyond or just within the tropics. The bark of many of them is astringent; and a species of *Lonicera* is used in Chili to dye black. The flowers of the greater part are as remarkable for their delicious fragrance as for their beauty. The fruit is usually, in some degree, emetic or purgative.

They are distinguished by their apparently jointed stems; simple, opposite leaves, with the footstalks of each pair commonly united at base; their flowers perfect, regular, or, more commonly, irregular, five-parted, in pairs or heads, with commonly two bracts at the base of the flower-stalk; calyx adherent to the ovary, with its border five-parted; corolla tubular, with its border five-lobed; stamens five, sometimes only four, inserted in the throat of the corolla and alternate with its lobes; ovary three, sometimes five celled; fruit a one-celled, sometimes three- or five-celled berry, with one or several seeds. The woody plants have a soft, light, more or less abundant, pith, wood usually brittle, and bark which becomes loose and stringy.

There are four genera found native in Massachusetts:—

The Twin-Flower, *Linnaea*, an humble, trailing, evergreen herb, with four stamens;

The Feverwort, *Triosteum*, an erect, simple, herbaceous plant, with five stamens;

The Honeysuckle, *Lonicèra*, a climber, with one to three celled, few-seeded berries ; and

The Bush Honeysuckle, *Diervilla*, an erect plant, with one to three celled, many-seeded berries.

XVIII. 1. THE TWIN-FLOWER. *LINNÆA*. Gronovius.

A genus containing a single species, which is a creeping, evergreen herb, indigenous to the northern part of the old and new world, with an ovate calyx-tube, four stamens, two of them longer, inserted into the base of the corolla, a three-celled ovary ; and fruit a dry, three-sided, one-seeded berry.

THE TWIN-FLOWER OF THE WOODS. *L. boreàlis*. Gronovius.

Figured in Hooker's *Flora Londinensis*, Plate 199.

In the pine woods in the northern parts of New England, where moss-covered columns support, at a great height, a thick, close top, the shaded ground is often carpeted with the leaves of this delicate and beautiful flower, alone, or intermingled with moss. Its woody stem creeps to the distance of several feet along or just beneath the surface, the raised branches sending out pairs of very small, roundish leaves ; and, at intervals, a slender, erect thread, bearing a pair of modest, drooping, fragrant flowers, white, or tinged with a faint blush of rose-color or purple. The leaves are one-fourth or one-half an inch long, nearly orbicular or elliptic, with two or three rounded teeth on each side, and scattered beneath and on the margin with a few hairs. The stem is reddish. The almost capillary flower stem, the bracts at the base of each partial stem, as well as the calyx, are covered with minute, glandular hairs, which are also found on the inside of the corolla. The calyx ends in five lanceolate segments. Beneath the calyx is a pair, sometimes two, of slender, linear bracts. The country people call this plant twin-flower. Bota-

nists have given it a name in honor of Linnæus. How often, in the dark forests of both continents, in the northern parts of which it is widely spread, has the name of the great reformer and systematist been called to the mind of his followers by the sight of this interesting plant!

“Linnæa,” says Sir James Edward Smith, “is so called in honor of the great Swedish naturalist, Linnæus; and appears, by the journal of his tour to Lapland, to have been chosen by himself to commemorate his own name, when he gathered it at Lyksele, May 29, 1732. Former botanists had called this elegant and singular little plant *Campánula serpyllifolia*; but Linnæus, prosecuting the study of vegetables on the only certain principles, — the structure of their parts of fructification, — soon found this to constitute a new genus. He reserved the idea in his own mind till his discoveries and publications had entitled him to botanical commemoration; and his friend Gronovius, in due time, undertook to make this genus known to the world. It was published, by Linnæus himself, in the *Genera Plantarum*, in 1737, and the same year in the *Flora Lapponica*, with a plate; being, moreover, mentioned in the *Critica Botanica*, as ‘a humble, despised, and neglected Lapland plant, flowering at an early age,’ like the person whose name it bears.”

XVIII. 2. THE FEVER ROOT. *TRIOSTEUM*. L.

A small genus, containing only four or five species of perennial herbs or low shrubs, found in North America and the mountains of Central Asia, with opposite leaves whose stems are somewhat united at base, and flowers on short stalks or sessile, in the axils of the leaves. The lobes of the calyx are long and slender, and form a permanent crown to the ripened fruit; the tabular corolla is a little longer than the calyx, and somewhat unequal; and the berry is leathery, and has three cells, and three or five elliptic, bony seeds.

THE FEVER ROOT. *T. perfoliatum*. L.

Figured in Bigelow's Medical Botany, I., Plate 9.

This is a hairy, coarse-looking plant, with upright, annual stems, from one to four feet high, proceeding from a large, horizontal, branched, perennial root. It is distinguished by its large, opposite leaves, the pairs crossing each other, and its brown, axillary, sessile blossoms, usually in clusters.

It is found in shady places, in rich, moist ground. The calyx is of five linear-lanceolate, sharp, brown segments, persistent upon the ovary. Ovary round, sessile, green, covered with brown, headed, glandular hairs, with a thread-like bract on each side. Corolla of a dull brownish purple, swelling at base, contracted just above, expanding towards the border, which is divided into five rounded, incurved, unequal segments. Stamens five, attached to the lobe of the corolla, hairy, yellowish white, with brown anthers. Style as long as the corolla; hairy, bearing a headed or shield-like stigma. Leaves two to six inches long and one to three broad, opposite, connate, in pairs, crossing each other, broad ovate, lanceolate, acuminate, entire, contracted towards the base, as if the petiole were winged, rough, veined, often waving, somewhat hairy above, velvety, pubescent beneath. Stem rough, hollow throughout. It flowers in June, and its orange berries are ripe in September.

The fever root has long had reputation for its medicinal virtues. The root, in the form of powder, or as an extract, has pretty regular effect as an emetic and cathartic. But, to be sure of its virtues, the practitioner must have it renewed every year, as it is thought to lose its efficacy from age. The stem and leaves seem to have much less active properties. The whole plant is bitter, and, in small doses, has a tonic effect.

XVIII. 3. THE HONEYSUCKLE. *LONICERA*. L.

A genus of climbing or erect shrubs, with opposite branches, and leaves entire, opposite, and often growing together at base. The flowers, which are often fragrant, are in sessile whorls or heads, or on footstalks, in the axils of the leaves. The species are divided by De Candolle into two sections.

The first section embraces climbing plants, with sessile flowers in whorled clusters or heads, and with leaves often connate; the berries crowned with the persistent limb of the calyx, forming the genus *Caprifolium* of Jussieu.

Among these are the Splendid SCARLET HONEYSUCKLE or TRUMPET HONEYSUCKLE, which has been very generally introduced, and found almost perfectly hardy, although it is a native of the Southern States, and not found naturally growing north of New York; and ten other species, according to Torrey and Gray, natives of North America, of which the following belong to Massachusetts.

Sp. 1. THE HAIRY HONEYSUCKLE. *L. hirsuta*. Eaton.

A perfectly hardy, climbing plant, found on damp, rocky banks, often growing to the height of fifteen or even thirty feet. Recent shoots reddish green, somewhat downy, or often nearly smooth. Branches reddish. Leaves on short, broad footstalks, which, in the upper leaves, are winged, and embracing the stem. The leaves are large, very broad-lanceolate or elliptic, or obovate, the upper ones pointed, the lower entire, rounded, sometimes rugose, from impressed veins above, ciliate on the reflexed margin, glaucous and soft, downy and hairy, beneath. The upper pair completely grow together at base, like the upper leaves in other honeysuckles. They terminate in an abruptly prolonged point, and are ciliate on the margin, and hairy on the midrib beneath; but, in surface and texture,

are so entirely unlike the other leaves, that they are more properly considered as connate bracts. The flowers are in single or triple terminal heads, made of from one to three or more whorls, on short footstalks; each whorl consists of about six sessile flowers. Calyx of five minute, angular teeth. Corolla a tube, gibbous on the outer side at base, contracted above, and expanding with two tips, the outer one of a single oblong, reflected lobe, the inner of four, rounded and slightly reflected at the extremity. The flowers, covered with a glandular pubescence, are of a pale yellow without, and hairy and of a rich orange within. The inner surface and the filaments below, hairy. Stamens a little longer than the corolla; style ending in a round, flattened, green stigma. Berries orange. Found in the western parts of the State and in Sudbury. Flowers in June and July.

Sp. 2. THE SMALL-FLOWERED YELLOW HONEYSUCKLE.

L. parviflora. Lamarek.

Stem light grayish. Recent shoots light glaucous, or greenish gray, with slightly projecting ridges. Leaves very glaucous, almost white beneath, and often with an undulate margin, giving them an appearance, at a little distance, of being armed with spines like the holly. Corolla yellow, tinged with purple. Berries orange. This is often an erect plant, of three or four feet, with no great beauty. It is perfectly hardy, as it is found growing abundantly in the western parts of the State. Flowers in June.

To the first section also belong the Woodbine or Common Honeysuckle, *L. periclymenum*, a native of Europe, very generally introduced into this country; and the Goat's Leaf Honeysuckle, *L. caprifolium*.

The Yellow Honeysuckle, *L. flava*, a native of the Southern States, has long been cultivated in Europe, and has thence been introduced here. It is valuable for its agreeable fra-

grance and the splendor of its large, yellow flowers. Still more desirable is the Evergreen Honeysuckle. This most beautiful of the American honeysuckles is not found wild, so far as I know, in Massachusetts ; but, as it is perfectly hardy, and more adapted to ornament gardens and front doors than either of the others, it ought to be introduced to universal notice.

The flowers are trumpet-shaped, the tube contracted in the middle, somewhat gibbous outwardly at base, enlarging upwards and opening with five reflected lobes, the outer one somewhat larger and separate. It is of a rich scarlet without, tinged with orange within and on the stamens, which are slightly projecting. The flowers are terminal and in rather distant whorls, on long footstalks.

The uppermost or two uppermost pairs of leaves are connate, forming a round or oblong leaf, through the centre of which passes the stem. The next leaves are four or five inches long and two or three broad. The lower ones much more narrow, but often longer. They are ovate-oblong, or elliptic, smooth, glaucous beneath. Recent shoots green. Stem gray, rough, the bark separating in long, fibrous scales.

The plant grows rapidly, throws out a multitude of branches, and has a singularly rich appearance, from the deep green of its leaves and the splendor of its scarlet flowers.

The second section includes erect or climbing plants, with flowers in the axils of the leaves ; berries in pairs, distinct or united, not crowned with the limb of the calyx, and with leaves which are never connate, — *Xylósteum* of Jussieu. The most beautiful and fragrant of this division is the Chinese or Japan Honeysuckle, *L. Chinensis*, not generally introduced, but as well deserving to be cultivated as any species whatever.

Four species are found in North America, two of them in Massachusetts. Both have two minute bracts at the summit of the flower-stalk.

Sp. 3. THE FLY HONEYSUCKLE. *L. ciliata*. Muhlenberg.

A shrub five or six feet high, with a few straggling branches, growing among rocks and in wet places in Essex woods. The stem is round, slightly ridged by a line running down from the base of each of the branches, giving it an angular appearance. Bark striated, roughish, of a grayish ash color, clouded with brown. Branches opposite, forming a large angle. Leaves opposite, on very short, somewhat hairy stalks, broad ovate, or lanceolate, sometimes heart-shaped, entire, pointed, of a soft green above, paler beneath, substance soft and leathery. Wood soft, greenish white, very tough when young. Pith white, abundant, in small stems, occupying nearly half the diameter. Flowers in pairs. The corolla is of a pale greenish yellow, with a slight projection on one side of the tube. Berries in pairs, diverging, egg-shaped, red, one fourth of an inch long. The flowers are in twos, on a long footstalk, with two, slender, short, thread-like bracts at the base of each.

Sp. 4. THE HAIRY FLY HONEYSUCKLE. *L. cœrulea*. L.

A rough-looking bush, from one to four feet high, with crowded, opposite, diverging branches, growing in bogs in the western part of the State. The leaves come out with the flowers. The flowers are on short stems, with long, slender bracts at the base of the calyx. From one calyx proceed two yellow corollas, bulging considerably outwards at the base of the tube, which ends in oblong, erect lobes. The leaves are oval or oblong, rough on both surfaces when young, but becoming smooth above when old. The berries, which are made up of two united ovaries, are blue, covered with a glaucous bloom.

XVIII. 4. THE BUSH HONEYSUCKLE. *DIER-
VILLA*. Tournefort.

A genus of three or four species of erect shrubs, indigenous to North America and Japan, with opposite, ovate, acuminate, sharply serrate leaves, on short stems, with axillary flowers, two, three, or four on a stem, with two bracts at base. The calyx-tube is cylindrical, and contracted at the summit; the ovary is two-celled, crowned with a fleshy disk, which fills the throat of the calyx; the fruit a crustaceous or leathery capsule, with two cells, two valves, and many seeds.

THE THREE-FLOWERED BUSH HONEYSUCKLE. *D. trifida*.
Mœnch.

A bush from two to four feet high, with a root somewhat creeping and horizontal, throwing up erect shoots. A projecting ridge, running down at equal distances on the four sides of the stem, gives it a somewhat four-sided appearance. The recent shoots are green or reddish green, with the projection very conspicuous between the leaves. The stem is gray. The leaves are opposite, on short footstalks, ovate or oblong-ovate, rounded or acute at base, beautifully tapering, acuminate, and serrate, smooth above, slightly fringed with bent hairs on the margin, and sometimes a little hairy on the veins beneath. The flowers, which are yellow, are terminal, or in the axils of the upper leaves; usually three on a stalk, of which the middle one is commonly sessile. The seed-vessel is very long, egg-shaped, with a long, taper point, crowned with the awl-shaped segments of the calyx. A variety occurs with the leaves narrower and thicker, much smaller, and constantly acute at base.



BUSH HONEYSUCKLE. (*Diervilla trifida*.)

FAMILY XIX. THE ELDER FAMILY. *VIBURNEÆ*. BARTLING.

Closely allied to the Honeysuckle Family, with which it has, until recently, been united, this small family, embracing about eighty species, found, generally, in the temperate regions of the northern hemisphere, is strikingly distinguished by its habit and mode of flowering. Many of the species have beautiful flowers and foliage, and are favorites in ornamental gardens. The snow-ball, so great a favorite in many countries of Europe and in this, is a sterile variety of *Viburnum opulus*. The fruits are, generally, acid or astringent, sometimes purgative. The sweet flowers of the common elder, both of Europe and of this country, are sudorific; and the European species has been used as such from ancient times. They are packed in casks, by the French, with fruit, to give it an agreeable odor. Elder-berry rob and wine have long enjoyed, in England, an apparently well deserved reputation. The leaves and inner bark of these same elders are offensive, and have emetic and particularly purgative qualities in a powerful degree. The fruit of some species of *Viburnum* are austere and astringent; of others, not unpleasant to the taste, and capable of forming an article of food. The Wayfaring Tree, the Guelder Rose, and the Laurustinus, all species of *Viburnum*, are ancient favorites in England and other parts of Europe; the latter, for the precious property of flowering, in warm countries, through the winter.

The plants of this family are shrubs or small trees, with apparently articulated branches and young stems containing pith of extraordinary thickness and durability; simple or compound, opposite leaves; perfect and regular flowers, in broad, terminal cymes; five-cleft, persistent calyx, adhering almost throughout to the ovary; a five-lobed bell or wheel shaped corolla, with lobes alternate with the parts of the calyx; five stamens inserted in the tube of the corolla and alternate with

its lobes; an ovary with one, three, or five cells, and an ovule in each; and a fruit, which is a pulpy or fleshy drupe, with one or three one-celled, one-seeded nuts.

Two genera, the Elder and *Viburnum*, are found here, flowering shrubs or low trees, very widely diffused in distant regions of the northern temperate zone; and, in New England, the conspicuous ornaments of the borders of fields and woods and the sides of enclosures, in the early part of summer.

The elder has compound leaves, and a pulpy fruit with three nuts; the *Viburnum* has simple leaves, and a fleshy fruit with one nut.

XIX. 1. THE ELDER. *SAMBUCUS*. Tournefort,

A genus of about twenty species of shrubs or perennial herbs, with a penetrating odor. Leaves opposite, pinnate, with the leaflets serrate, cut or laciniate, with two stipules or glands at the base of each. Flowers white or somewhat flesh-colored, usually fragrant, in compound cymes. There are two species in this State.

Sp. 1. THE PANICLED ELDER. *S. pùbens*. Michaux.

This is usually a coarse-looking bush, four to six feet high, with a large, whitish stalk, becoming brown when old, dotted with rusty, oblong dots, which enlarge and give a rough and warty appearance to the older and darker part of the stem.

The leaves are opposite, on large, round, fleshy footstalks, channelled above. The leaflets are five or seven, ovate-lance-shaped, rounded or acute, sometimes heart-shaped, at base, tapering to a long point, serrate, of a dull, dark green above, whitish, pubescent beneath.

The common flower-stalk is stout, long, and channelled, bearing a cyme of several pairs of alternating opposite, horizontal stalks, repeatedly dividing by twos or threes, at as large an angle as possible, so as to form a pyramidal head or thyrsus,

two or three inches long. At the fifth division, are the flowers in pairs or threes, on short stems. The fruit, which is ripe in June and July, is a round, scarlet berry, surmounted by the three stigmas and the five obtuse segments of the calyx, and containing a yellowish, unpleasantly tasted, liquid pulp, and three stones or nuts. The variety with seven leaflets, more uncommon, has its leaflets nearly sessile, and is usually a much taller plant.

Drs. Torrey and Gray mention a variety found in the Catskill Mountains, with white berries. They have sometimes found the plant a small tree, eighteen feet high. The common variety is found in Worcester County, in the towns on every side of the Wachusett Mountain.

Sp. 2. THE COMMON ELDER. *S. Canadensis*. L.

Found in every part of the State, and throughout Canada and the United States. It is a shrub, eight to ten feet high, growing in wet ground, and conspicuous in June and July for its broad cymes of white flowers. The leaf-stalks, flower-stalks, and leaves are much smaller than in the preceding species. The stem is covered with a grayish bark, marked with prominent dots of the same color. Recent shoots smooth and green.

Leaves opposite, compound, with a smooth stalk, channelled above. Leaflets from five to eleven, on short stalks, oblong, ovate or obovate or elliptic, round at base, tapering to a long, acute point, serrate with large hooked serratures, paler beneath, nearly smooth on both surfaces, when the fruit is mature, downy beneath when young.

Flowers white, in broad cymes five to seven inches across, on long, channelled, tapering stalks, divided and subdivided by fives. Pedicel a slender, white thread, ending in a short calyx with five acute segments. Corolla a very short tube, with five ovate, rounded divisions. Stamens five, short, at-

tached to the corolla and alternating with its segments. Stigmas five, brown, sessile, on a conical ovary. The lower leaflets have often one or two leaf-like appendages. The berries are small, dark purple, or nearly black, when ripe, with crimson juice. This plant has a near resemblance to the Common Elder of Europe, *S. nigra*, except that the latter is a tree of twenty or thirty feet in height. Sir J. E. Smith said of this that the English "uncertain summer is established by the time the elder is in full flower, and is entirely gone when its berries are ripe." The same might be said with equal truth of our elder, which, like that, flowers in June and ripens its fruit in September; unless we take into consideration that transient return of soft weather and sunshine called the Indian summer. Much use has always been made, in every part of Europe, of the medicinal and economical virtues of their elder. The same may be made of ours. An infusion of the juice of the berry is a delicate test for acids and alkalies.¹ An infusion of the bruised leaves is used by gardeners to expel insects from vines. A wholesome, sudorific tea is made of the flowers. The unopened flower-buds form, when pickled, an excellent substitute for capers. The abundant pith is the best substance for the pith-balls used in electrical experiments; and the hollow shoots are in great use with boys for pop-guns and fives.

XIX. 2. THE GUELDER ROSE. *VIBURNUM*. L.

A genus of more than fifty species of shrubs or small trees, with opposite branches, often more or less distinctly angular; opposite, undivided, or lobed leaves, with footstalks; and white flowers in terminal cymes, those of the margin sometimes sterile, and with the corolla much enlarged: calyx five-toothed; corolla five-lobed; stamens five; stigmas three, fruit a one-celled, one-seeded drupe.

¹ See Annals of the Lyceum of New York, p. 42.



Armstrong & Co. lith. 166 Congress St Boston.

NAKED VIBURNUM. (*Viburnum nudum*.)

SECTION FIRST. — *Flowers all similar and fertile.*Sp. 1. THE NAKED VIBURNUM. WITHE ROD. *V. nudum*. L.

See our Plate.

A slender, erect shrub, from six to twelve feet high, several varieties of which are found growing in swamps and wet woods, from Newfoundland to Georgia. The recent shoots are dark green, with numerous minute, rust-colored scales. The older stems are covered with a light, ash-colored bark. The fruit-stalks, leaf-stalks, under surface of the leaves, and the midrib somewhat above, are sprinkled with brown, rusty dots or scales. The leaves are opposite, two or three inches long, very variable in width, on short, flattened petioles which nearly or quite embrace the smaller branches, varying from broad-lanceolate to oval-elliptic, obovate, and sometimes rhomboidal, the extreme ones more or less attenuated at both extremities, the lower ones obtuse at each end, entire, obsoletely serrate or crenate, coriaceous, smooth and shining above, beneath dotted with rusty brown scales. Footstalks rather long, channelled, and slightly winged.

The flowers are white, or yellowish white, in terminal cymes, on a footstalk half an inch to two inches long. The branches, radiating from a single point, are flattened, channelled, and angular, and much subdivided, with linear, fugacious bracts at the base of the pedicels. Flowers crowded; the calyx ending in five, thin, membranous, white, obtuse teeth; the corolla small, cup-shaped, with obtuse segments. Filaments very long; anthers small, yellow. The flowers expand in May and June.

The fruit is apple-shaped, compressed, with the minute calyx in the terminal cavity, one quarter of an inch long, of a deep blue color, and with a glaucous bloom; it is ripe in September. It has a sweetish taste and may be eaten. The stone

is flattish, with an obtuse point, slightly hollowed on one side and convex on the other. The slender, tough rods of the previous year are much used, in some parts of the country, to bind sheaves.

Sp. 2. THE SWEET VIBURNUM. *V. lentago*. L.

Figured in our Plate.

A beautiful small tree, rising sometimes to the height of fifteen or twenty feet, with rich foliage, and clothed, in June, with a profusion of delicate, showy flowers. The branches and recent shoots are of a grayish brown, dotted, and often with a scaly or dusty surface. The smaller stems and larger branches are of a dark purple, almost black. The branches are opposite, at large angles. The leaves are broad oval, or lance-ovate, acute, rounded or sometimes heart-shaped at base, acuminate, sharply serrate, smooth above, paler or ferruginous beneath; the footstalk is rather long, channelled above, conspicuously margined with an irregular, waved, or glandular border. The leaf-stalk, fruit-stalk, under surface of the leaf and the midrib above are set with ferruginous, glandular dots or scales. The leaves are often half bent backwards.

The flowers are in terminal cymes, sessile, in the axil of a pair of leaves or branches. Five or more stalks spring nearly from one centre, and, diverging an inch or more, divide repeatedly into three or more shorter branches, at the base of which is often visible a minute linear bract. The pedicels are very short, terminating in a round ovary, surmounted by a calyx of five minute segments, above which rests a salver-shaped corolla of one petal, expanding with five oval, rounded, reflexed segments of pure white. From the angles of these segments rise the five stamens, with slender, tapering filaments, longer than the corolla, and bearing on their point a short, yellow anther.

The great number of the anthers in a head of flowers gives a yellow tinge to the whole, and a very agreeable fragrance is

diffused; amidst the flowers are often seen the leaves rising. The fruit is large, often half an inch or more long, on stout stems, oblong, flattened, and, when ripe in October, turns from a rich scarlet to a shining blue black, covered with a glaucous bloom and crowned with the permanent calyx-segments, surrounding the stigma. It is not unpleasant to the taste. The nut is oblong-oval, flattened, with an obtuse point, and grooved on both sides. The sweet viburnum is found from Canada to the mountains of Carolina and Georgia.

There is a softness and richness about the flowers and foliage of the sweet viburnum which distinguish it above all others of the same genus.

It is hardly less beautiful in fruit, from the profusion of the rich blue berries hanging down among the curled leaves, which are beginning to assume the beautiful hues of autumn. A tree of this kind makes a fine appearance at the angle of a walk, or in the corner of a garden, as its delicacy invites a near approach, and rewards examination. With this delicacy of appearance, it is a hardy plant, and may sometimes be seen on a bleak hill-side, where it has encountered the north-west, stormy winds for a score of years.

Sp. 3. THE ARROW WOOD. *V. dentatum*. L.

An erect shrub or small tree, four to fifteen feet high, growing in every part of the State, and from Canada to Louisiana, in swamps and wet grounds, remarkable for the yellowish green color and the large teeth of the leaves. The old stems are nearly black, and, from the damp places in which the plant grows, are often covered with thin, whitish lichens. The recent shoots are yellowish green, smooth, and obscurely four-angled, with a few brownish dots. The stem in young plants is grayish purple above, darker below. The branches are opposite, at rather sharp angles. The leaves are opposite, often reflexed, on reddish green, channelled footstalks, which are half an inch or an inch in length. They are broad-ovate, or

inversely egg-shaped, on the flowering branches nearly orbicular, on the growing shoots much longer, rounded or heart-shaped at base, pointed or acuminate at the extremity, conspicuously toothed, the teeth ending in a rather blunt point, yellowish green and shining above, lighter beneath, with strongly prominent veins, downy at the axils. In October, they become of a dark crimson.

The flowers are white, in terminal cymes, nearly flat above, on grooved, obscurely four-angled footstalks, enlarging upwards, and two or three inches long; from three to seven, angled, light yellowish-green branches, radiating from a common point on the central stalk, and afterwards branching somewhat irregularly. The ultimate flower-stalk very short. Calyx ending in minute, white teeth. Corolla in one piece of five expanding, rounded petals, with erect or diverging stamens at the angles within. Styles short, white. The fruit is of a dark lead color, when ripe, roundish-oval, crowned by the five brown, crushed teeth of the calyx, surrounding the triple or apparently single stigma.

The young shoots of this tree are said by Marshall (*Arbustum*, p. 160) to have been generally used by the natives for arrows, whence it is known by the name of arrow wood.

Sp. 4. THE MAPLE LEAVED ARROW WOOD. *V. acerifolium*.

A slender, low shrub, not often more than five or six feet high, remarkable for the resemblance of its leaves to those of the red maple. It is found in rocky woods throughout the State, and from Canada to the country beyond the Mississippi. The stem is erect, with a brownish bark, and very infrequent wart-like, whitish dots. Recent shoots of a lighter brown or pale green, and with the leaf-stalks and flower-stalks downy and scattered with hairs. Branches opposite, ascending at a sharp angle. Leaves opposite, from two to four inches long, and of nearly equal breadth, rounded or heart-shaped at base,



ARROW WOOD. (*Viburnum dentatum*.)

MAPLE LEAVED ARROW WOOD. (*Viburnum acerifolium*.)

three-lobed, with large, irregular teeth, waved, smooth or somewhat hairy, and impressed at the veins above; lighter and downy, and hairy, particularly on the veins and veinlets, beneath; the lobes diverging, separated by a broad, shallow notch, and ending in a prolonged, often bluntish point. The leaf-stalks appressed and swelling at base, round, one inch or less in length, with scattered hairs and somewhat downy, and with colored, linear, pointed stipules at base, or assuming the form of glands higher up. The terminal leaves are often entire, without lobes, and broad ovate or roundish in shape.

The flowers are in terminal cymes, on round, smooth, or slightly pubescent stalks, gradually enlarging, and about two inches long, with two linear, perishing bracts at the end. The partial footstalks, about six in number, radiate from one point, and, repeatedly and somewhat regularly subdividing by threes or twos, terminate in pairs of very short flower-stems. The flowers are tinted with pale purple before opening. The calyx ends in five small, obtuse, appressed, colored teeth. The corolla is white, cup-shaped, with five ovate, pointed or rounded, reflexed segments. Stamens on tapering filaments, twice as long as the corolla, bearing a large, short, yellow anther. The berries are oval, a third of an inch long, pointed, compressed, oval, blue-black when ripe, and very disagreeable to the taste. The nut is of the same shape, slightly grooved.

SECTION SECOND. — *The flowers in the margin of the cymes much larger than the others, and sterile.*

Sp. 1. THE HIGH CRANBERRY. CRANBERRY TREE.

V. ôpulus. L.

See our Plate.

A handsome, low tree, five to ten feet high, ornamented throughout the year with flowers or fruit. In May, or early in June, it spreads open, at the end of every branch, a broad cyme of soft, delicate flowers, surrounded by an irregular

circle of snow-white stars, scattered, apparently for show. From the common axil of the upper pair of leaves, a stout, furrowed footstalk, one or two inches long, separates into five, six, or more, radiating branches, from each of which, after successive similar subdivisions, proceed a number of crowded flowers, diverging, on short, partial footstalks, from a single, central point. Each perfect flower is a white cup of a single piece, with a border of five round lobes, sitting in a green calyx with a few obsolete teeth, and bearing, from its base, within, five upright stamens, twice as long as itself, which support whitish anthers opening from the top. The germ is a short, white, conical body, terminating in two or three minute stigmas, and seeming, when the corolla is gone, immediately to surmount the calyx. At the base of the flower-stems and branches, are long, linear, brown, fugacious bracts. The outer florets are on longer stalks, barren, salver-shaped, of five larger, unequal, obovate, rounded lobes.

The leaves are opposite, from two to five inches long, straight, rounded or acute at base, three-nerved, and with three very divergent, acuminate lobes, and large, unequal, obtuse teeth, strongly veined, paler beneath. The footstalks are three-fourths of an inch to an inch in length, with one or two glandular stipules below, and a few glands near the base of the leaf and towards the bottom, the lower ones hair-like.

The fruit, which is red when ripe, is of a pleasant acid taste, resembling cranberries, for which it is sometimes substituted. Drs. Torrey and Gray have shown that there is no essential difference between this plant and the European *Guelder Rose*, *V. opulus*, a variety of which, propagated by gardeners, is the well-known *Snow Ball Tree*.

Sp. 2. THE WAYFARING TREE. HOBBLE BUSH. *V. lantan-
dides*. Michaux.

Figured in Audubon's Birds, II., Plate 148.

This plant received its specific name, *lantanòides*, from its resemblance to the English Wayfaring tree, *V. lantàna*, the tree which William Howitt addresses, when he says, —

“Wayfaring tree! what ancient claim
Hast thou to that right pleasant name?”

* * * * *

Whate'er it be, I love it well;
A name, methinks, that surely fell
From poet, in some evening dell,
Wandering with fancies sweet.”

Book of the Seasons, p. 115.

That tree rises to the height of eighteen or twenty feet, and has an ample head of white flowers. Ours, less fortunate in its name, — which comes from the impediment which its prostrate branches often are to a walker in the woods, — is a stout, low bush, found in dark, rocky woods, and making a show, in such solitary places, of a broad head of flowers, the marginal ones often an inch across. It has large, opposite, very diverging branches, often declining to the ground, and a dark brown bark, scattered with a few grayish, wart-like dots. The recent shoots, flower-stalks, and leaf-stalks are profusely clothed with a brown, rusty down, which gradually disappears from the branches, except towards the joints.

The buds come out in threes, of which the middle one often contains flowers and leaves, the side ones leaves only. They have no scales, but are, instead, clothed with a close, rusty tomentum, which gives them the appearance of leather. The leaves are from four to six inches in length and breadth. The leaf-stalks have an appendage at base, which, though gradually shrivelling, is very large at first, forming a broad wing near the base, and terminating in awl-shaped points.

The leaves are roundish, heart-shaped at base, ending in a short, abrupt point, and unequally serrate on the margin. They are nearly smooth above, but beneath downy on the veins, which are thereby rendered strikingly distinct. The primary veins, which are prominent, branch only on the lower side, and are intersected at right angles by the parallel secondary veins, forming a beautiful net-work.

The cymes or heads of flowers radiate from two or more points, the partial footstalks having at their base linear or strap-shaped, leathery, deciduous bracts. The fruit is ovate, large, of bright crimson color, turning afterwards almost black. The minute calyx occupies the terminal cavity. The nut is oblong-oval, with an obtuse point, flattened, and grooved on both sides.

FAMILY XX. THE HEATH FAMILY. *ERICACEÆ*.

Few families embrace a greater variety of extremely beautiful plants than this. Few are so universally the favorite objects of cultivation. They recommend themselves to the cultivator by their hardiness, many of them being natives of this or of similar climates, by their showy and lasting flowers, and often by their evergreen leaves. There are three very distinct subdivisions of the family; the Heaths, the Rhododendrons, and the Andromedas. The *Pyrolas* and *Monotropas*, still more distinct, are by some authors considered as forming a separate family. Of the true heaths we have no native species. The greater part of them are indigenous to the Cape of Good Hope, whence they have been most extensively introduced into the conservatories of Europe and America; a few are natives of Europe. Of the other allied tribes we have many representatives in New England. Distinguished by their singular beauty, peculiar appearance, and usually their social or gregarious habits, they are found in all climates and in almost all parts of the world, except New Holland, in which their place is taken by their near allies, the *Epacrideæ*.

The plants of this family are shrubs, under-shrubs, or trees, with leaves mostly entire, coriaceous, and sempervirent, without stipules. The flowers are usually perfect, symmetrical, and regular. The calyx is usually four- or five-cleft; the corolla four-parted, rarely five-parted, with the parts alternate with those of the calyx; the stamens are as many as the segments of the corolla and alternate with them, or twice as many, inserted in the base of the corolla, or in the edge of a disk at the bottom of the calyx; anthers two-celled, opening by a terminal pore or cleft, and with often a pointed bristle projecting above or below. The ovary is free, with cells as numerous as the segments of the calyx and alternate with

them, and many-seeded ; or rarely one-celled. The fruit is capsular, or rarely berrylike, and generally many-celled and many-seeded.

In their properties, they are almost universally more or less astringent and diuretic, and many of them abound in tannin. But the different tribes have different properties. The heaths of the north of Europe are used by the inhabitants to tan leather, to dye yarn, as an ingredient in beer, and as a material for thatching ; and the seeds afford food to many kinds of birds. Most of the plants of the *Rhododendron* group are of a doubtful character, and to some animals several of them are poisonous. The fleshy berries of some of the *Andromeda* group are an agreeable and healthy article of food. Honey made by bees that feed on the flowers of the European heaths is said to be of an inferior quality, and that from bees fed on some species of *rhododendron* is considered poisonous. The pleasantly acidulous berries of the Strawberry Tree, *Arbutus ûnedo*, are eaten in the south of Europe, and in Corsica an agreeable wine is prepared from them. Its bark is very astringent ; and, in Spain and the East, is employed in tanning.

THE ANDROMEDA TRIBE. *ANDROMEDÆÆ*. DOX.

Shrubs with a capsular fruit and deciduous corolla.

XX. 1. THE ANDROMEDA. *ANDROMEDA*. L.

Humble shrubs found in North America, and also in northern Asia and Europe ; with a five-cleft calyx, with acute segments, simple at base ; a globose corolla with a contracted mouth ; and ten included stamens with bearded filaments, and short, one-awned anthers.

THE WATER ANDROMEDA. *A polifolia*. L.

It was for this modest and delicate plant, which is a native of the north of Europe, as well as of this country, that Lin-

næus selected the poetical name of the genus. The following is the account which himself gives of it in his "Tour in Lapland," I., 188. "*Andrómeda polifolia* was now (June 12) in its highest beauty, decorating the marshy grounds in a most agreeable manner. The flowers are quite blood-red before they expand; but, when full grown, the corolla is of a flesh-color. Scarcely any painter's art can so happily imitate the beauty of a fine female complexion; still less could any artificial color upon the face itself bear a comparison with this lovely blossom. As I contemplated it, I could not help thinking of Andromeda, as described by the poets; and the more I meditated upon their descriptions, the more applicable they seemed to the little plant before me; so that, if these writers had it in view, they could scarcely have contrived a more apposite fable. Andromeda is represented by them as a virgin of most exquisite and unrivalled charms; but these charms remain in perfection only so long as she retains her virgin purity, which is also applicable to the plant now preparing to celebrate its nuptials. This plant is always fixed on some little turfy hillock in the midst of the swamps, as Andromeda herself was chained to a rock in the sea, which bathed her feet, as the fresh water does the roots of this plant. Dragons and venomous serpents surrounded her, as toads and other reptiles frequent the abode of her vegetable ressembler; and, when they pair in the spring, throw mud and water over its leaves and branches. As the distressed virgin cast down her blushing face through excessive affliction, so does this rosy-colored flower hang its head, growing paler and paler till it withers away." "At length comes Perseus, in the shape of summer, dries up the surrounding water, and destroys the monsters, rendering the damsel a fruitful mother, who then carries her head (the capsule) erect."

This, as it is found here, is a low shrub, a foot or more in height, growing naturally in boggy places, but capable of being successfully cultivated in any common, moist soil. The

stem is clothed with a grayish bark, with a few short leafy branches near the top, and with umbels of drooping, snow-white, or flesh-colored flowers at or near the end. The branches are slender, and covered with a pearly, sometimes reddish, bark. The leaves are on short petioles, narrow, lanceolate, much revolute at the edges, pointed, glossy green above, of a pure glaucous or whitish color beneath. The short, pearl-white flower-stems spring from the bosom of ovate, concave, pointed bracts of the same color. The short, acute, persistent segments of the calyx are white, tipped with red. The corolla is five-angled, nearly globular, almost closing at the mouth, with the obtuse segments revolute. A faint, rosy tinge is often spread over the whole flower. The stamens are very short, with brown anthers, which open in two terminal pores, and are tipped with short, awl-like bristles. The round ovary terminates in a club-shaped stigma. Flowers in June. It is found on the edge of Richards's Pond, in Brookline; on tussocks in a bog in Richmond; and elsewhere. This plant, like others of its kind, may be propagated by dividing the root, or by layers.

Several other species, which had been included in the genus *Andromeda*, have been elevated by Don into new genera; *A. calyculata* to *Cassandra*; *A. paniculata* to *Lyonia*; and *A. racemosa* to *Zenobia*. Their great difference in habit and appearance seems to authorize a change made on botanical grounds.

XX. 2. THE CASSANDRA. *CASSANDRA*. Don.

A genus of two species of low shrubs, covered with a fine pubescence, which makes them look as if sprinkled with dust. The leaves are leathery and persistent; flowers white. The calyx is five-leaved, with two bracts at base; the corolla oblong, enclosing ten stamens, with anthers which terminate in tubes. Both species are cultivated in Europe for their beauty.



CLUSTERED ZENOBIA. (*Zenobia racemosa*.)

DWARF CASSANDRA. (*Cassandra calyculata*)

THE DWARF CASSANDRA. *C. calyculata*. D. Don.

A low, leafy, evergreen shrub, from two to five feet high. The bark on the principal stem and larger branches is very smooth, and of a remarkably dark copper color. The recent shoots are covered with a close, brownish down, which is not entirely removed till the end of three or four years.

The leaves are alternate, on very short petioles, oblong-lanceolate, often larger towards the extremity, rather obtuse, obsoletely serrate, and somewhat revolute at the margin, shining above and dotted with scaly dots, which beneath are rust-colored.

The flowers are in racemes, on the ends of the branches, in the axils of last year's leaves. These leaves are much smaller than those not supporting flowers, and are formed later in the previous season. They diminish in size to the extremity of the branch, where they are only two or three lines long.

The flower-stalks are short and stout, and, at the time of fruit, are arranged in two rows. Just below the calyx are two very short, rounded, acuminate bracts. The segments of the calyx are five, pointed, with a membranous border, coriaceous, persistent, and protecting the fruit, and closely covered with white scales.

Corolla white, egg-shaped, somewhat five-sided, contracted towards the mouth, ending in five slightly reflexed, rounded, brownish teeth, between which the point of the pistil shows itself. Stamens ten, opening from the base of the corolla; filament ribbon-shaped, white below, gradually tapering to a brownish thread. Pistil persistent, tapering, gradually dying down to the capsule. Fruit a capsule, round, flattened, opening late by five valves, two-coated, the external, dark, coriaceous, the internal, whitish yellow, and remaining on the branches until the appearance of the flowers of the succeeding spring. Anthers brown, of two long, conical tubes, open-

ing at the point. It forms large beds in the edge of swamps or boggy meadows, where it opens its abundant and showy racemes in April, among the earliest flowers of spring.

XX. 3. THE LYONIA. *LYONIA*. Nuttall.

A genus so named by Mr. Nuttall to commemorate the name of John Lyon, an indefatigable collector of North American plants, who fell a victim to a dangerous epidemic, amidst those savage and romantic mountains which had so often been the theatre of his labors. — *Nuttall*, Genera I., 266.

It consists of a few North American shrubs, with entire or denticulate, membranous or downy, leaves, and rose-colored or white flowers, in lateral or terminal panicles: distinguished from the preceding by having the anthers opening lengthwise, and by their five-angled, five-celled capsules, with five valves having their margins closed by five other external, narrow valves.

THE PANICLED LYONIA. *L. paniculata*. L.

A bushy shrub from three to eight feet high, conspicuous in the early part of summer for its long and crowded panicles of white flowers, and afterwards for its persistent, five-cleft seed-vessels. The root is strong and tough. Its stem and irregular branches are covered with a light pearly, ash-colored, stringy bark, which, on the last year's shoots, is reddish, and, on the recent shoots, light green, and often downy. The leaves are in bunches, or alternate, on short, appressed stalks, lance-shaped, elliptic or inversely egg-shaped, entire, or minutely serrate, acute or acuminate at each end, smooth above, lighter and downy beneath.

Flowers in an irregular, terminal, compound panicle, with small leaves at the base of the branches, and linear, brown, very fugacious bracts; partial footstalks, thread-like, downy.

Calyx greenish, of five teeth, scarcely distinguishable by the eye from the corolla to which it closely adheres. Corolla white, nearly globose, with five minute, reflected teeth almost closing the orifice. Anthers with doubly curved filaments, bringing the anthers round the base of the pistil, which is nearly as long as the corolla.

Lyònia mariàna, — *Andrómeda mariàna* of our botanists, — another beautiful plant, is found in Rhode Island, and probably will be in Massachusetts.

XX. 4. THE ZENOBIA. *ZENOBIA*. D. Don.

North American, evergreen shrubs, bearing racemed flowers, with a five-lobed calyx and bell-shaped corolla, with ten stamens, whose anthers have long, tubular cells, ending in two awns.

THE CLUSTERED ZENOBIA. *Z. racemòsa*. De Candolle.

A low shrub, four to six feet high, with irregular, straggling branches, much resembling the whortleberry bushes. Leaves on very short petioles, broad-lanceolate or oval, acute at each extremity, serrulate, of nearly the same color on both surfaces, somewhat downy on the veins beneath. Flowers in regular racemes, one to three or four inches long, on the ends of the floral branches, and usually protected by the leaves; they are all turned downwards, and have been likened to rows of teeth. Partial flower-stalk very short, with two small, colored bracts at base. Calyx of five lanceolate, pointed, greenish or brownish white segments, embracing the corolla, and, after that is fallen, closely adhering to the ovary.

Corolla oblong-cylindrical, contracted at the mouth, semi-transparent at the line of the segments, which are rounded and diverging or revolute at the extremity. Filaments dilated at base, short, white, tapering to a brown point, supporting the brown anthers, which are cleft, each division having two

awns. Style exserted. The ovary becomes a dry, globular capsule, which opens in five recurved valves, surrounded by the persistent calyx and bracts, and remaining usually till the flowers of the next year appear.

This is a beautiful but much neglected plant. Few exotics have such elegance of appearance. Few are so little known. This, like the plants of the previous genera, may be easily cultivated. They require a peat soil or sandy loam. Don says of them, "Being very ornamental, they are desirable shrubs in every garden. They are propagated by layers or by seeds. The seeds should be sown in pots or in pans, in sandy peat soil; they should be covered slightly with earth, as they are extremely small."—*Gen. Sys.*, III., 831.

Oxydendrum arboreum, *Andrómèda arborea* of American botanists, is a handsome, small tree, belonging to this group, which might be easily introduced here, as it grows freely a little farther south.

XX. 5. THE CLETHRA. *CLETHRA*. L.

The name is the Greek word for the alder, which the plants of this genus resemble in their leaves. They are mostly American shrubs, with alternate, deciduous leaves, and white, bracteate flowers, in axillary or terminal spikes. The calyx is five-parted, persistent; corolla so deeply five-parted as to appear five-petalled; stamens ten, with pointed anthers; capsule enclosed by the calyx, with three, many-seeded cells, which open in the middle.

THE ALDER LEAVED CLETHRA. *C. alnifolia*. L.

Poorly figured in Catesby's *Carolina*, I., 66.

A shrub from two to eight feet high, showing a long spike of white, fragrant flowers towards the end of summer, when most other shrubs have long cast their blossoms. It grows



SWEET PEPPER BUSH. (*Clethra alnifolia*)

naturally and abundantly by slow streams, or in islets in deep bogs, where it can, at most seasons, bathe its feet in water.

The flower-stem is of a whitish green and downy, below which the shoot is of a faint reddish color, covered with a gray down. The stem at last becomes dark purple, striate with gray. The leaves are inversely egg-shaped, gradually tapering at base to a short, downy footstalk, pointed, and serrated with pointed serratures from below the middle to the extremity, smooth, downy on the midrib above, a little hairy on the midrib and primary veins beneath. Flowers in long racemes, terminal, or from the axils of the upper leaves. Cup of five short, hollow, ovate, pointed, white, downy segments, which are persistent, and, after the fall of the corolla, close round and protect the ovary. Petals apparently five, oblong, concave, rounded at the extremity, twice as long as the calyx, white, with lines of green. Stamens ten, long, cylindrical, unequal. Anthers with two diverging lobes, pointed at the apex, opening by pores below, at length inverted, orange-brown. Ovary round, downy. Style as long as the stamens. Stigma three-parted. Capsule obtusely triangular, opening by the sides of the three cells, and containing many small angular seeds attached to the partitions.

This beautiful plant may be easily cultivated, and is much improved by cultivation, the spikes being increased in length and in the size of the flowers. It grows readily in any garden soil, and may be propagated by layers or cuttings.

There are several other species of clethra which might be introduced, especially the *acuminate*, the *panicled*, and the *downy*, which would doubtless flourish, as they are natives of the higher parts of the Southern States, and have been successfully cultivated in the open air in England. The first of these is a small tree. They all continue in flower from July to October.

XX. 6. THE GROUND LAUREL. *EPIGÆA*. L.

Creeping, tufted, roughish, evergreen, American undershrubs, with alternate, entire leaves, and fragrant flowers in dense axillary and terminal racemes. The calyx is deeply five-parted, with three bracts at the base; the corolla salver-shaped, villous within, with a five-parted, spreading border; stamens ten, with anthers opening inwards from top to bottom; capsule five-celled, many-seeded, encircled by the persistent calyx. There are two species, — one found on mountain tops, in the Antilles, the other here.

THE MAYFLOWER. *E. repens*. L.

Often from beneath the edge of a snow-bank are seen rising the fragrant, pearly, white or rose-colored, crowded flowers of this earliest harbinger of the spring. It abounds in the edges of woods about Plymouth, as elsewhere, and must have been the first flower to salute the storm-beaten crew of the "May Flower" on the conclusion of their first terrible winter. Their descendants have thence piously derived the name, although its bloom is often passed before the coming in of the month of May.

The trailing stem runs along for several feet just beneath the covering of leaves on the surface of the ground, throwing out from the sides or joints, at distances of two or three inches, bunches of fibres or long fibrous roots, and ascending flower and leaf-bearing shoots, which usually enlarge upwards. The extremities spread on the ground, brown, hairy, and rough. The flowers are in terminal, crowded, sessile clusters or corymbs. At the base of each partial footstalk is a whorl of three, concave, lanceolate, hairy, green bracts, ending in a long point. Just above is the calyx of five narrow, subulate segments, half as long as the tube of the corolla. The rose-

colored or white pearly corolla is a long tube, very hairy within, the extremity expanding into five rounded lobes. On the throat appear the yellow anthers, opening from top to bottom, and resting upon slender filaments, hairy towards the base, proceeding from the bottom of the tube. Leaves alternate. Footstalks hairy, half as long as the leaves, channelled above. Leaves oblong, cordate, rounded at the extremity, and often mucronate, ciliate on the margin, coriaceous and evergreen, smooth and shiny above; veinlets impressed; shiny and somewhat hairy, especially on the midrib and veins beneath. Stigma headed, five-pointed; style straight; ovary ovate, hairy. The flower-buds are formed in August.

The Mayflower is found as far north as the Saskatchewan, throughout Canada and Maine, and thence to the sand-hills of Carolina and Georgia.

XX. 7. THE BOXBERRY. *GAULTHERIA*. L.

A genus named by Kalm, the favorite pupil of Linnæus, in honor of Gaulthier, a physician and botanist of Quebec, in Canada. It contains, according to De Candolle, about forty species, the greater part of which are found in North and South America, especially in Mexico, some on the mountains of Central Asia and Java, three in New Zealand. They are shrubs and under-shrubs, sometimes low trees, with alternate leaves, and axillary or terminal, often fragrant, flowers, white, rose-colored, or scarlet. The calyx is five-cleft, with two bracts, distinct or united, beneath; corolla ovate, with a short, revolute, five-cleft border; stamens eight or ten, with hairy filaments, and anthers bi-lobed at top, each lobe two-awned; ten scales, distinct or united, in the bottom of the cup; capsule depressed, globose, five-furrowed, five-valved, five-celled, many-seeded, invested at base by the calyx, which sometimes becomes berry-like.

THE CHEQUER BERRY. PARTRIDGE BERRY. *G. procumbens*. L.

Figured in Bigelow's Medical Botany, Plate 22. Audubon's Birds, with the Wood Wren, II., Plate 179.

A delicate, fragrant, evergreen plant, growing in the deep shade of other evergreens, throwing up from a creeping root a tuft of three or four, sometimes seven or eight, leaves, and nearly as many flowers. Stem an inch or two high, dotted with white dots, downy, with one or two linear, brown, abortive leaves near the surface of the ground.

Leaves elliptical or obovate, pointed at each extremity, or sometimes rounded at the end with a delicate, reflected, membranous border, and a few distant teeth or serratures, ending often in a bristle. They are of a leathery texture, and of a polished dark green above, lighter below, supported by a short, rather stout, often hairy, petiole.

Flowers of a pearly white, solitary, from the axils of the leaves, on white or reddish, slender, hairy or downy footstalks, one third or one half an inch long. Calyx double; the exterior of two very short, broad, concave, pointed bracts, the interior ending in five or six triangular teeth. Corolla monopetalous, conical, broad at base, and gradually diminishing towards the top, where it suddenly contracts and terminates in five or six rounded teeth, nearly closing the orifice. Filaments very short, white or pink, hairy without. Anthers as long as the filaments, set upon their inner side, brown, large at base, divided half-way down, each division terminated with two pointed bristles or awns. Style nearly as long as the corolla, uniform, surmounting a five-sided, or rounded, greenish ovary, which rests on a deep green disk with ten projecting teeth. The flower-stalks bend down, so that the flowers and fruit hide themselves under the leaves.

Flowers in May, and also in the end of summer and in autumn; and the fruit is ripe in autumn and in spring. The berry is of a bright scarlet, pleasant to the taste, but rather

insipid. It is often eaten in the spring when no other berry is to be found. Its importance to the partridges and other birds who hibernate in our climate, gives it its most common name. It is also called Chequer Berry, Box Berry, Ivory Plum, and Mountain Tea. The whole plant has a pleasant, aromatic flavor, similar to that of the black birch.

The leaves are sometimes employed as a substitute for tea, or added to communicate an agreeable flavor. An essence and an oil are extracted from the plant, which possess, in a high degree, the astringent, warming, and tonic properties of the leaves. An infusion of the leaves has been successfully employed to restore the action of the breast, when that fountain had been dried up.

This plant is found from Quebec, in Canada, to the mountains of Carolina.

XX. 8. THE BEAR BERRY. *ARCTOSTAPHYLOS*. Adanson.

A genus of twelve or thirteen species of low shrubs with alternate leaves, terminal, bracteate racemes of white or flesh-colored flowers, and red or black fruit, natives of North America, chiefly the mountains of Mexico, and rocky woods and sunny mountain tops of northern Europe and Asia. Calyx five-parted, persistent; corolla ovate-pitcher-shaped, with a short five-toothed, reflexed mouth. Stamens ten; filaments hairy, dilated at the base; anthers compressed, opening by two pores at the apex, with two reflexed awns on the sides; ovary depressed-globose, girt with three fleshy scales; style short; stigma obtuse; drupe globose, five-, six-, nine-, or ten-celled; cells one-seeded.

THE COMMON BEAR BERRY. *A. uva ursi*. Sprengel.

Figured in Bigelow's Medical Botany, I., Plate 6.

A shrubby, evergreen plant, trailing upon the ground or on rocks, and forming large, close mats, on dry, sandy plains or

rocky hills. Stem woody, with a grayish bark, which peels off in patches. Young shoots ascending, clothed with a brownish, downy bark. Leaves crowded towards the end of the branches, alternate, inversely egg-shaped, obtuse at the end, wedge-shaped at base, smooth on both surfaces, shining above, paler and reticulate beneath, with a fringe of soft hairs on the margin, on a short, downy footstalk. Flowers drooping, in a terminal cluster. Flower-stem short, with a lance-shaped, persistent bract at base, and two short, concave ones just above. Calyx of three to five reddish, rounded segments, which remain and invest the base of the ripe fruit. Corolla pitcher-shaped, flesh-colored, pellucid at the base, hairy inside, with a contracted mouth of five short, reflexed segments. Anthers short, dark purple, opening with terminal pores, and tipped with two long, crimson, reflexed bristles; filaments thick at bottom, tapering, hairy. Stigma short, cylindrical. Ovary green, orbicular, resting on a flattened, purple torus.

Berries globular, of a deep red, filled with a tasteless, mealy pulp, and a drupe made up of five wedge-shaped nuts. They remain on through the year, and serve as food for partridges and grouse.

This plant abounds in the Alps and Pyrenees, and in all the northern and mountainous parts of Europe, as well as in this country. Every part of the plant is very astringent. In Sweden and Russia it is employed in great quantities in tanning, in the preparation of morocco, and sometimes for dyeing wool an ash color. In Iceland, according to Sir William Hooker, it is used to impart a deep brown and a black color. "A deep brown dye is produced by boiling the cloth in water, with a quantity of the leaves of *sortilyng* or *Arbutus uva ursi*" (for six hours, in an iron pot). To make it afterwards black, it is boiled with a paste of earth called *sorta*.¹ In medicine, it has been found efficacious in diseases affecting the urinary passages and in those of the kidneys.

¹ See Journal of a Tour in Iceland, p. 215 of the 2d ed.

THE RHODORA TRIBE. *RHODOREÆ*. Don.

This section contains many of the most showy and ornamental evergreen or deciduous plants known, and several of the most beautiful are native to our climate. They are distinguished by having flat leaves with the midrib callous, and flower-buds with imbricated scales resembling the cones of pines.

XX. 9. THE ROSE BAY. *RHODODE'NDRON*. L.

Shrubs or trees, mostly evergreen, with alternate, very entire leaves, and showy, purple, lilac, rose-colored, white or yellow flowers, in terminal corymbs, growing naturally on the mountains of Europe and Asia, in North America, and on the continent and islands of India. Many of the species have been much cultivated for their beauty, and many curious and beautiful varieties have been formed by hybridizing. The Tree Rose Bay, *R. arboreum*, found on the mountains of Nepaul, at a height of not less than ten thousand feet above the sea, has natural varieties, with purple, intensely red, rose-colored, and white flowers. "They attain the size of very large forest trees, and are noble objects at all times. They blossom simultaneously in April, in which state the beauty of them surpasses all description, the ample crown of the trees being entirely covered with bunches of large and elegant blossoms." — *Wallich, Pl. As. Rar.* The flowers are eaten by the natives, and are formed into a jelly by Europeans. The Alpine Rose Bay, *R. ferrugineum*, which grows in the pasturelands amongst the Alps and Appenines, has extremely beautiful flowers of lilac, inclining to rose-color, of a disagreeable odor. The leaves are considered poisonous, and a weak infusion of them acts powerfully as a sudorific. The Pontic Rose Bay, *R. Pónticum*, a native of Lebanon and the mountains of

Asia Minor, has flowers of nearly the same color, the odor of which is considered by the inhabitants of the coast of the Black Sea as unwholesome, and the honey made by bees feeding on the flowers has, since the time of Xenophon, been considered poisonous, producing vertigo and nausea in those who eat it. Pallas denies that this property of the honey is owing to the effect of the flowers of the rose bay, and attributes it to the flowers of *Azalea Póntica*, which, he says, grows plentifully among the bushes of rhododendron, and which is known to render honey deleterious. The Purple Rose Bay, *R. puniceum*, so called from the color of the flowers, is a magnificent tree of the mountains of the north of India. Its leaves are often covered with a sugary substance, which hardens to the appearance of varnish. The rose bay of Mount Caucasus has lilac-colored flowers; the Golden-flowered, *R. chrysanthum*, a low shrub, with flowers of citron yellow with orange dots, is spread extensively in Russia and Siberia, where a decoction of its leaves is a celebrated remedy for rheumatism and affections of the skin. In small doses, it is sudorific; in large, poisonous. The Daourian and the Kamtschatka rose bays, very low shrubs with rose-colored flowers, and the Chinese, *R. Indicum*, of purple, flesh-color, rose, white, or yellow, are, with all those above-mentioned and some others, cultivated in Europe and in this country. The species indigenous to the United States are the American Purple, *R. purpureum*, the Catawba, the Dotted, *R. punctatum*, all which are much cultivated and highly prized; Pursh's, the Lapland, — and the American, *R. maximum*, one of the most beautiful, and the only true rhododendron found growing spontaneously in Massachusetts. The leaves of the Bell-flower Rose Bay, *R. campanulatum*, are used as snuff by the natives of India. The same use is made of the leaves of *R. maximum* in this country; and the snuff is considered efficacious in catarrhs and other affections of the head. The rhododéndron has a five-parted calyx; a five-lobed (rarely seven-lobed) corolla, which



Armstrong & Co. Lith. Boston

Rhododendron (maximum.)

is funnel-shaped, bell-shaped, or rarely wheel-shaped, with the limb either equal or somewhat two-lipped, the upper lip being broadest and usually spotted. The stamens are five or ten (rarely six to nine, or fourteen), free from the corolla and commonly declined and projecting; with anthers opening by two oblique, terminal pores. The ovary has five or ten cells, with many ovules in each. The capsule is five-celled, five-valved, rarely ten-celled, ten-valved; the seeds numerous, compressed, winged, attached to the central axis.

THE COMMON AMERICAN ROSE BAY. DWARF ROSE BAY.

R. maximum. L.

Figured in Bigelow's Medical Botany, Plate 51; in Audubon's Birds, II., Plate 103; and in Michaux, Sylva, II., Plate 67.

The rose bay, as it occurs growing spontaneously in this State, is a low, spreading plant, with its lower branches lying on the ground, and its central stems rising to the height of from three to six or seven feet. It forms round or straggling clumps or islets in the swamps where it is found. In more southern States, it sometimes rises to the height of twenty or twenty-five feet, with a diameter of four or five inches. The stem is grayish, and rough with loose, broken flakes of bark. The recent shoots are large, and, with the leaf-stalks, are yellow, or of a yellowish green color, often covered with white dust. The older branches are dark purple, and soon turn gray.

When the leaves first begin to expand, they are of a reddish color and covered with an abundant red down or cotton. When fully expanded, they are smooth, of a shining light, afterwards dark green above; when several years old, they become brown, coarse, and rough. Their lower surface is pale or rust-colored. They are from three or four to eight or nine inches long, and one or two broad, elliptic-oblong, round, obtuse, or acute at base, with a very entire, slightly reflexed,

border, and ending in a rather sharp, entire point. Their texture is firm, tough, and leathery, and they are supported on very stout footstalks, flattened or hollowed above, half an inch or an inch long.

The flowers are in round, thyrses-like, crowded clusters, from four to eight inches broad, on the ends of the branches. The large, conical flower-buds are formed in September. Just before expanding, they are one or two inches long, and an inch broad, invested with a large number of concave, rhomboidal, pointed, more or less colored scales, one of which protects each separate flower-bud, and among which the richly colored corolla is seen at intervals. As the flowers expand, these scales fall off, leaving numerous scars at the base of the common flower-stem. Each flower is supported by a stalk one or two inches long, which, as well as the calyx leaves, is covered with a viscid or glutinous down, and has long, thread-like, downy bracts, on each side at the base. The calyx is divided into five unequal, rounded segments, of a delicate texture. The corolla is of one piece, with a border expanding from a short tube into five unequal, oblong, rounded segments, the upper one of which is largest and has its cavity mottled with numerous small, yellow or greenish or orange-colored spots. The color of the corolla varies in different exposures and on different plants, with every shade of rose and flesh-color to pure white. The stamens are ten, very unequal, inclining towards the lower side of the flower, of the color of the corolla, on slender filaments, which are larger and densely covered with silky down near the base. The anthers consist of two short sacks, opening at the apex with round, bordered pores, and discharging white pollen. The ovary is roundish, surmounted by a curved style which gradually enlarges upwards and terminates in a broad, five-sided, stigmatic surface. The capsule is egg-shaped, five-angled, and five-celled, with numerous, minute seeds.

The rose bay is found as far north as the town of Standish,

on the borders of Sebago Lake, in Maine. It grows in great abundance in an extensive swamp in Medfield, not far from Charles River, and in a smaller one in Attleborough. It everywhere delights in deep, moist shades. In the Northern States, it occurs only at intervals, in protected situations. It is of more frequent occurrence in the Middle States; and in the deep valleys among the higher ranges of the Alleghanies, especially in Virginia, it becomes so abundant, according to Michaux, on the sides of the mountain torrents, as to form impenetrable thickets, in which the bear finds a secure retreat from the pursuit of dogs and hunters.

Pursh describes three marked varieties of the American Rose Bay: the first, with rose-colored flowers, found in the mountains, by rivulets and lakes, from Canada to Carolina, flowering in June and July; the second, with smaller flowers, perfectly white, in the shady cedar swamps of New Jersey and Delaware, flowering in July and August; the third, with purple flowers, growing on the highest mountains of Virginia and Carolina, near lakes, and flowering in May and June. This last grows to a large size, with a stem eighteen inches in diameter, and foliage thrice the size of any other variety. He considers it as approaching the Pontic Rhododendron. The two former varieties, which differ only in the color and size of the flowers, are to be found in Massachusetts.

The Dwarf Rose Bay is readily cultivated, if planted in the peat or bog soil which is everywhere to be found in New England, and if care be taken to protect it from the scorching heat of summer, and to place it in a sheltered situation, where it shall not be exposed to the severest winds of winter. It richly deserves a place in every garden.

It is the most beautiful native flower of Massachusetts, and is singularly well fitted to ornament a parlor. A flower-bud, not beginning to open, has been placed in a vase, where it opened its flowers as well as if left on the stem; and the flowers continued fresh and beautiful more than fifteen days.

SECTION AZALEA. — The Azaleas differ from the true Rhododendrons in having only five stamens, and their leaves deciduous. They differ still more in habit and properties. The flowers are large and fragrant, and, in the different species, they are yellow, white, flesh-colored, rose-red, or variegated, and covered externally with hairs or with a glandular pubescence. The Pontic Azalea, the one longest known and cultivated, has yellow, orange, or white flowers, which exhale a fragrance similar to that of the honeysuckle, but stronger, and reputed unwholesome.

Sp. 1. THE SWAMP PINK. WILD HONEYSUCKLE. *R. viscidum*.
Torrey. *Azalea viscosa*, L.

Figured in Audubon's Birds, II., Plate 115, and in our Plate.

A flowering shrub, growing abundantly in open woods or on their borders, in low, wet grounds, in most parts of New England. Springing from a small root, with an ashen or slaty and various colored or clouded stem, seldom more than an inch in diameter, and throwing out branches in imperfect whorls or stages, this beautiful plant rises to a bushy head at six or eight feet from the ground. In the end of May, the season at which the flowering begins, it is remarkable for its large, cone-like flower-buds, composed of many scales, which, opening and falling, expose to view bunches of fragrant, irregular flowers. The leaves are alternate, or in tufts of five or six, at the ends of the branchlets which encircle the flower-stalk. They are inversely egg-shaped, pointed at the end with a brown, callous point, reflex and ciliate on the margin, smooth and sometimes shining above, with the midrib bristling beneath and tapering at base to a short stalk.

The flowers are six to twelve, in a diverging whorl or terminal corymb, their stems, when few, issuing from nearly the same point. At the foot of each green or colored flower-stem



Sprague, del

Armstrong & Co. lith. 166 Congress St Boston.

- 1 SWAMP HONEYSUCKLE (*Azalea viscosa*.)
- 2 UPRIGHT HONEYSUCKLE (*Azalea nudiflora*.)

are a white, hollow, obovate, bract-like scale, nearly as long as the stem, and one or two fugacious, thread-like bracts, much shorter. The stem and flower are covered with glandular, sometimes glutinous, hairs. The calyx is usually short, with five rounded or pointed, ciliate or hairy, teeth. The corolla is a white or scarlet, oblique tube, set with brownish, viscous hairs, and expanding into five unequal, reflexed, pink segments, of a pure white, or sometimes with a tint of flesh color within. Three or four stamens are usually longer, and one or two shorter, than the corolla, with scarlet threads, downy below and smooth above, bending upwards, and supporting a light, rust-colored, linear anther, opening obliquely at the extremity by two round pores. The ovary, at flowering, is a five-sided pyramid. The style is scarlet, slightly hairy, a little longer than the stamens, with a capitate stigma. The fruit, which often remains on the stem till the flowers of the succeeding season appear, is a dry, five-celled, many-seeded capsule, with valves opening from the centre and top, and having the persistent, sickle-shaped style at the end of the central axis.

There are many permanent varieties of this plant in its native state, differing in the color and viscidness of the flowers, the shape of the calyx-segments, and the color of the leaves. The most marked are : —

Var. 1. — *Glaucum* of Pursh, in which the leaves are green above and glaucous beneath ;

Var. 2. — Leaves pale above and glaucous beneath, with the teeth of the calyx long, spatulate, and reflexed ;

Var. 3. — Leaves glaucous on both surfaces, and with later flowers.

Few flower plants have been more valued and cultivated in European gardens than this. None more readily hybridizes with the other rhododendrons and azaleas. In Loddige's Catalogue for 1836, more than one hundred hybrid varieties are enumerated, most of them beautiful.

Sp. 2. THE UPRIGHT HONEYSUCKLE. *R. nudiflorum*.
Torrey. *Azalea nudiflora*. L.

Figured in Abbott's Insects of Georgia, I., Plate 27, and our Plate.

A low, spreading shrub, distinguished from the last by its broader and fuller leaves and more highly colored flowers. These are in bunches of six or more, radiating from one or two points. The flower-stems are longer than the tube, deeply colored, and set with short hairs. Calyx of five, oblong, short sepals, unequal, with a row of hairs on the edge. Tube of the corolla dark red, border shorter and of a fainter color. The very prominent stamens are of a dark maroon color, as is the still longer style. Stigma rounded, dark purple.

This is found in the southern part of the State, towards the borders of Rhode Island, and in several parts of Worcester County, but far less abundantly than the last. It, however, grows as freely in the open air, and shows the same tendency to produce varieties and the same facility in hybridizing. Nine distinct varieties, native or occurring in cultivation, are described by Don, and forty-three additional ones are enumerated in Loddige's Catalogue.

The rhododendrons grow in almost any soil, if in a situation protected from the cold winds of winter and the burning sun of summer; and I have seen the *maximum* flourishing where exposed to both. But they do best in a somewhat close and tenacious soil, rather moist. They may be propagated by cuttings, by layers, or by seeds. The latter mode is considered best; the seeds to be sown in peat soil, or in fine, sandy loam, in a shady border. When transplanted, they should have a ball of earth left adhering to the roots.

THE RHODORA. *RHODORA*. L.

From *rhodon*, a rose.

Calyx five-toothed; corolla two-lipped; stamens ten; capsule five-celled, five-valved; leaves deciduous.



Armstrong & Co Lith 156 Congre

ARMSTRONG & CO LITH 156 CONGRE

ARMSTRONG & CO LITH 156 CONGRE

ARMSTRONG & CO LITH 156 CONGRE

THE CANADA RHODORA. *R. rhodora*. Don. *Rhodora Canadensis*. L.

See our Plate.

An early flowering shrub, from one to three feet high, distinguished for its copper-colored stem and glaucous leaves, and clusters of naked flowers coming out before the leaves appear. The recent shoots are straight and erect, of a light brown, sometimes hairy, enlarging gradually to the extremity. The shoots of the preceding year are covered with a porcelain-like cuticle, which peels off, and leaves, on the older branches, and irregular, crooked stems, a bright, copper-colored, smooth bark. The leaves are borne on short footstalks, narrow, lance-shaped, or oval, acute at each extremity, revolute at the margin, pale green or glaucous above, lighter and glaucous and downy beneath.

The flowers are in little tufts at the ends of the branches. The stem is very short and somewhat hairy. The calyx is very minute. The purple, or rose-colored corolla is deeply cleft, and seems to consist of two narrow petals, round at the end, and one broader, ending in three lobes. The three are slightly united at base. Stamens ten, as long as the corolla, with filaments somewhat hairy below, sustaining short, roundish, purple anthers, opening by two terminal pores. Ovary bristly. Style purple, longer than the stamens, supporting a large stigma. The capsules are half an inch long, divided into five cells by valves which open inwards, the partitions being formed by the margins of the valves turned inwards. At the time of flowering, the leaves are just beginning to be visible, covered with hairs, pushing from the very small, scaly leaf-buds. This plant, which flowers in April or May, is found in the neighborhood of Boston, and not unfrequently in wet land in other parts of the State. It also occurs in Newfoundland, in Maine, and in Connecticut.

XX. 10. THE AMERICAN LAUREL. *KALMIA*. L.

A small genus of beautiful, flowering, American plants, named by Linnæus in honor of Peter Kalm, a favorite pupil, a traveller and distinguished botanist. The leaves are alternate or in ternate whorls, and evergreen, except in the species *K. cuneata*, in which they are deciduous; the flowers in terminal clusters or compound corymbs; the buds are naked. The flowers are rose-colored, purplish, or white. The calyx is five-parted; corolla salver-shaped, with a five-lobed border with ten horn-like projections on the lower surface, in the cavities of which above, nestle the anthers. Stamens ten, with anthers opening by oblique pores. Capsule five-celled, many-seeded, the partitions formed by the borders of the valves. Five species are known, two of them in Carolina and Florida, the other three in New England. Most of the species are considered poisonous; one of them, the narrow-leaved, is known to be fatal to lambs, and thence gets its common name. Mr. Nuttall thinks it not improbable that the deleterious honey sometimes complained of, may have received its injurious property from the flowers of the *Kalmia latifolia*. Kalm, who paid much attention to the genus, says that the leaves of this species are found to be poisonous to calves and lambs, and deleterious to cattle, sheep, and horses; while they are the food of stags when the snow covers the ground and hides other provision from them. The occasionally poisonous quality of the flesh of partridges has been attributed to their feeding on the buds of *Kalmia*; but Wilson, the ornithologist, says he has eaten freely and without ill consequences upon the flesh of these birds, when their crops had been found distended with *Kalmia* buds. Dr. Barton considers the *Kalmia* deleterious to the human system, and says that the Indians made use of a decoction of the leaves to destroy themselves. Dr. Bigelow, who has collected the facts in relation to this subject,



Spangue del.

Armstrong & Co lith. 166 Congress St Boston.

MOUNTAIN LAUREL. (*Kalmia latifolia*.)

and himself made experiments and chemical analyses to ascertain the properties of *Kalmia latifolia*, is inclined to think that "the noxious effect of the Kalmia upon young grazing animals may be in some measure attributed to its indigestible quality, owing to the quantity of resin contained in the leaves."

Sp. 1. THE MOUNTAIN LAUREL. CLAMOUN. SPOONWOOD.

K. latifolia. L.

Figured in Bigelow's Medical Botany, I., Plate 13; also in Catesby's Carolina, II., Plate 98; Abbott's Insects, I., Plate 37; in Audubon's Birds, I., Plate 55; and in our Plate.

This extremely beautiful shrub occurs in various parts of the State; on the shores of Massachusetts Bay, at Cohasset, in several points on both sides of Buzzard's Bay, in the neighborhood of Newburyport and Lowell, in many parts of Worcester County, on every side of Wachusett, and in the towns on both declivities of the Green Mountains. In the deep, shady ravines of these mountains, it sometimes attains a height of fifteen or even twenty feet, with a diameter of three or four inches: in most other places, and especially on open ground, it rarely exceeds four or five feet. On an open, rocky pasture of many acres, south of Meeting-house Pond in Westboro', it forms large, close clumps or islets, intersected by plots and alleys of grass. In June and July, when every one of these innumerable green islets is crowned with white or rose-colored flowers, and cattle are feeding on the grass or lying under the few oaks which are scattered through the pasture,—the whole, with the lake and its fringe of trees, is worth going out of one's way to see.

The Indians called this plant *clamoun*. It is sometimes called spoonwood, rarely, calico bush; most frequently, mountain laurel, or broad-leaved Kalmia.

The stem of the mountain laurel is slender, with branches in twos or threes, or in imperfect whorls. The bark on the re-

cent branchlets is of a yellowish green, which in a year begins to turn brown, and afterwards becomes ash-colored. The epidermis on the older stems easily and often peels off in long plates, leaving a brownish or grayish bark. The principal stem in old stocks is covered with a grayish brown, entire bark, cleft regularly with long, smooth clefts. This difference in bark often gives the branches the appearance of having been grafted. The leaves are scattered, opposite, or in whorls or tufts, from two to four inches long, and two-fifths as broad, oval, acute at each extremity, very entire, polished above, somewhat reflexed at the edge, with the midrib prominent, of a soft, leathery texture, on footstalks one quarter or one third of their length. The flowers are in terminal heads, which crown the last year's leaves, and consist of two or three stout stems proceeding from the axil of as many leaves, and giving off from one to three pairs of opposite branches. The partial flower-stalks are an inch or more long, covered with glandular hairs. Each branch and partial stalk has a short, pointed bract at its base, and a shorter ovate one on each side. The calyx is persistent, of five, short, ovate, pointed segments, covered with glutinous hairs, and green, with colored tips, expanded till the corolla has fallen, after which it embraces the ovary. The corolla is monopetalous; before opening, it has the shape of a ten-angled casket; on expansion, it becomes salver-shaped, with a short tube, and a border of five, triangular, raised lobes. The stamens are ten, with white filaments, bent back and nestling their brown anthers in little cavities in the side of the corolla. On being touched, they escape with a spring and bend over, around the pistil. The anthers open with two oblique, terminal pores. The color of the corolla varies from a pure white to a rich rose. The border of the tube within is painted with a waving, rosy line, and there is a delicate pencilling of purple above each depression for the anthers. The ovary is round, green, with white, glandular hairs, and an erect, club-shaped pistil, longer than the stamens, and remain-



Sprague, del

Armstrong & Co lith 166

NARROW LEAVED LAUREL. (*Kalmia angustifolia*.)

ing after the corolla has fallen. The capsule is globular, imperfectly five-angled, set with glandular, glutinous hairs, five-celled and five-valved, with numerous minute, compressed seeds attached to the central axis.

The wood of the mountain laurel is very smooth, close-grained and hard, and that of the root is marked with red lines. It is substituted for box, is well adapted to the turner's use, and for the engraver on wood, and is employed in making the handles of small tools, screws, boxes, and musical instruments.

Found in nearly all parts of the State, and from Canada to Florida. Flowering in June and July. Easily cultivated in a moist soil, and richly deserving a place in every American garden.

Sp. 2. THE NARROW-LEAVED LAUREL. *K. angustifolia*. L.

Figured in Catesby's Carolina, I., Plate 117, where it is called *Chamædaphne sempervirens*; Audubon's Birds, II., Plate 195; and in our Plate.

A low, evergreen shrub, usually half a foot or a foot high, rarely two feet, forming often small tufts or patches in low grounds. The stem is ascending, covered with a brown bark, shining through the thin, membranaceous, silvery epidermis, in recent shoots of a light reddish green. Branches often in threes. Leaves in whorls of three, entire, lance-shaped, revolute on the margin, with the midrib very prominent beneath, shining green above, paler and often rusty beneath, of a soft, leathery texture, those of the previous year browner and harder. Flowers in corymbs, in from three to twelve whorls of three, in the axils of the persistent last year's leaves, and surmounted by the new leaves. In each axil is a panicle, consisting of about three imperfect whorls of three flowers. At the base of each flower-stem is a small linear bract, and two smaller ones are on the sides. The flowers are very beautiful, of a deep rose-red.

From its supposed poisonous effect upon lambs, this plant is

often called *lamb-kill* or *sheep-kill*. It is found from Hudson's Bay to Georgia.

There are many slight varieties of this plant, some of them remarkable for leaves glaucous beneath and somewhat so above.

Sp. 3. THE PALE LAUREL. *K. glauca*. Aiton.

Figured in Audubon's Birds, II., Plate 193, and in our Plate.

An almost aquatic plant, with a long, straggling stem, a greenish brown, smooth bark, and slender, two-edged, opposite branches, or three-edged in whorls of three. The leaves are mostly opposite, or in threes, nearly sessile, linear-lance-shaped, entire, obtuse or pointed, wedge-shaped at base, revolute at the edge, or a brilliant dark green above, whitish or glaucous beneath. Flowers in terminal corymbs, made of alternately opposite pairs, or in threes, from the axil of a small leaf or bract, with two lateral scales. Footstalks thread-like, three-fourths of an inch long. Calyx persistent, with five long, obtuse, brown segments. Corolla pale rose-colored, with cavities to receive the ten anthers, which are supported on stamens proceeding from the central portion of the corolla, with filaments surrounded by a circle of hairs at the base, and brown anthers.

This plant is found in Richmond, in Berkshire, and in a few other places in the State. Dr. Alexander pointed it out to me in Hubbardston, growing with *Ledum*, in an open, sphagnous swamp, which had been used as a reservoir for a mill-stream, and had thus been kept full of water nearly throughout the year. When I gathered these plants there, the swamp was overgrown with a most abundant growth of *Cassandra calyculata*, covering the surface with a purplish brown hue. Amidst this the sphagnum had formed masses a foot or two above the general level, on which the *Ledum* and *Kalmia* were growing; their long, prostrate, root-like stems penetrat-

ing to a considerable distance in the spongy mass. On the edges were *Rhodora* and *Andromeda*; the general, more wet level was occupied by cotton grass, and the dry banks by narrow-leaved *Kalmia*, huckleberries, and other shrubs that avoid the water. It is found from near the Arctic circle in Canada to Pennsylvania.

The flower of *Kalmia glauca* has been compared to a miniature parasol, the corolla to the covering, the stamens to the ribs, and the style to the handle.

XX. 11. THE LABRADOR TEA. *LEDUM*. L.

A genus of two species of low, evergreen under-shrubs, with alternate, coriaceous leaves, more or less revolute, downy beneath, odorous when crushed; and white flowers in terminal corymbs,—found in cool, wet places, in the northern regions of both continents. The calyx is five-toothed; the corolla has five spreading petals; stamens five or ten; capsule five-celled, many-seeded, with five valves opening from the bottom upwards; seeds numerous, linear, with a membranous wing on each side. The species which is common to the two continents has a bitter and astringent taste and narcotic properties. In Russia, the leaves are used in tanning, and are substituted for hops in beer, which has, in consequence, the property of causing headache and vertigo. One species is found in Massachusetts.

THE BROAD-LEAVED LEDUM. LABRADOR TEA. *L. latifolium*. L.

Figured in Audubon's Birds of America, II., Plate 191.

A low, evergreen, branching shrub, with the recent shoots and under surface of the leaves densely covered with rust-colored wool. The older branches are reddish brown or copper-colored; the stem is nearly black. The leaves are on very short footstalks, lance-shaped, obtuse, with the border much revolute, of a light green above, and covered with a rusty

down or wool beneath. Flowers erect, in crowded, terminal corymbs, on slender, somewhat downy stems, rising from the bosom of a short, concave bract, covered with resinous dots. The calyx is minute, with five obtuse teeth. Corolla of five oblong, rounded, white petals. Stamens from five to ten, as long as the petals, on slender filaments, with small, white, or yellowish anthers opening by two terminal pores. Ovary roundish. Style white, turning red, as long as the stamens, persistent, with a small stigma. The capsule is oblong-oval, crowned with the style, and supported by the calyx, nodding until it begins to open, which it does by five valves at bottom, when it is inverted and pendent. The leaves growing on branches near the ground are sometimes nearly destitute of wool, and are flat, short, elliptical, and scattered with resinous dots beneath. The root or subterranean stem is large, and throws out numerous wool-like radicles. Flowers in May and June.

In Labrador, its leaves have been used as a substitute for tea. It is found in all the countries north of us, and in sphagnum swamps in Pittsfield, Richmond, and Hubbardston, in this State. The ledum may be cultivated in a peat soil or sandy loam, and is regularly propagated by layers or by seeds.

FAMILY XXI. THE WHORTLEBERRY FAMILY. *VACCINIEÆ*.

DE CANDOLLE.

The whortleberries and cranberries take the place, throughout the northern part of this continent, of the heaths of the corresponding climates of Europe; and fill it with not less of beauty, and incomparably more of use. This family includes erect or creeping shrubs, with numerous, irregular branches, simple, alternate leaves, on short stalks, sometimes coriaceous and perennial, and flowers solitary or in racemes. The characteristics are nearly those of the previous family: calyx adherent to the ovary, entire, or with from four to six lobes, with which the equally numerous lobes of the corolla alternate; the stamens double that number, and distinct, with two-horned anthers opening by pores or short slits; ovary four- or five-celled; style and stigma simple; berry crowned by the persistent limb of the calyx, succulent, four- or five-, or eight- or ten-celled; cells one- or many-seeded; seeds minute.

This family has usually been made a tribe of the Heath Family, from which it differs essentially only in its juicy fruit surmounted by the calyx-segments. Most of the plants which it comprehends bear pleasant and wholesome fruits, and are found chiefly in the temperate, or on mountains in the warmer regions, of America. Some are found in Europe; some, on the continent and islands of Asia, and on islands in the Atlantic, Pacific, and Indian Oceans. The leaves and bark have astringent and tonic properties. Many species deserve cultivation for their beauty.

Four genera are found in Massachusetts:—

The Huckleberry, with stony fruit;

The Whortleberry, with erect stems, ovoid corollas, and agreeably acidulous fruit;

The Cranberry, with creeping stems, expanded or revolute corolla, and acid fruit; and

The *Chiogenes*, with creeping stems, bell-shaped corolla, and white, pleasant fruit with a chequer-berry flavor.

XXI. 1. THE WHORTLEBERRY. *GAYLUSSACIA*.
Gray.

A genus of nearly eighty species of shrubs and under-shrubs, rarely small trees, occurring most numerous in North America, and less frequently in tropical America, Madagascar, northern India, the Sandwich Islands, middle and northern Europe and northern Asia, with alternate, sometimes evergreen, leaves, and solitary or racemed flowers and fruit. Most of the species bear edible and wholesome berries. The bark and leaves of the three European species are very astringent and have been much employed in tanning. The fruit of the Bilberry, *V. myrtillus*, the best of the three, is highly esteemed for its agreeably acidulous taste. Vinous and alcoholic drinks and vinegar are prepared from it. The juice, with lime, verdigris, and sal-ammoniac, furnishes the painter a beautiful purple color; with sulphate of copper and alum, it gives a blue, of no great permanence, but often used in the preparation of colored paper. The name *whortleberry*, originally given to this species, is derived from the Saxon *heort-berg* or *heorot-berg*, the hart's berry. Similar uses are made of the Bog Whortleberry, *V. uliginosum*, of Europe, which is inferior in flavor. Of the leaves of this, with *Lycopodium alpinum*, the Icelanders make a yellow dye for woollens.

Most of the whortleberries in New England change their leaves in autumn to different deep shades of scarlet and crimson, contributing, more than any other family, to the peculiar richness of coloring which characterizes our woods and open plains at that season.

Dr. Gray has very properly separated the first three species from the rest, under the name of *Gaylussacia*. They differ from the other species especially by the fruit containing ten cells, with a seed-like nutlet in each; whence they are often called stony huckleberries.



BLACK HUCKLEBERRY. (*Gaylussacia resinosa*.)

DANGLEBERRY (*Gaylussacia frondosa*.)

Sp. 1. THE BLACK WHORTLEBERRY. HUCKLEBERRY. *Gay-lussácia resinôsa*. Torrey and Gray.

Figured in our Plate.

A shrub from eighteen inches to three feet high, rather erect; much branched; the branches slender, and, when young, pubescent. Stem mahogany color, beneath a semi-transparent, pearly epidermis. Leaves on lateral or terminal branches, with short petioles, oblong-oval or elliptic, very entire, mostly obtuse, thin, profusely dotted beneath with atoms of yellowish resinous matter, giving a yellowish green color to the lower surface. Flowers on short, lateral racemes, with minute, lanceolate, colored bracts near the base of the stalks. Calyx yellowish green from the resinous dots; segments acute; corolla small, five-angled, ovate, conic, contracted at the mouth, of a dark, dull red, with sometimes a tinge of pale yellow below. Stamens shorter than the corolla. Style projecting beyond the corolla. Stigma capitate. The berries are globular, of a shining black color, and sweet. A horizontal section shows them to have ten cells, in each of which is one hard, stony seed; only two or three of the whole number coming to perfection. This fruit is more firm than that of any other species, and is more valued in market.

The common variety has black, shining berries, and leaves green on both surfaces.

A second variety has similar leaves and berries, covered with a blackish or brownish bloom, and very sweet.

A third variety has somewhat glaucous leaves, and berries covered with a glaucous bloom.

A fourth variety has larger berries, of a bluish color, with a bluish bloom, and very rich to the taste.

There are other varieties, differing in color as in fruit. Those I have mentioned are the most strongly marked.

In consequence, apparently of the sting of some insect, the flower of this whortleberry sometimes expands to twenty or

thirty times its natural size, and becomes of a fleshy texture, resembling the fungus-like excrescence common on the Swamp pink, *Rhododéndron viscidum*. All the leaves on the end of a branch are sometimes affected in the same manner.

This whortleberry is found on rocky hills, and flowers in May. It occurs from Canada, and the shores of Lake Huron, to the mountains of Georgia.

Sp. 2. THE DANGLEBERRY. *G. frondosa*. Torrey and Gray.

Figured in our Plate.

This is easily distinguished by its loose mode of flowering, and its large, pale leaves, which are glaucous beneath. It is a spreading bush, three or four feet high, with a crooked, much branched, light ash-colored stem. The recent shoots and fruit-stalks are of a light, pale green, or of a pale reddish yellow; the branches and stem, of a mahogany or bronze color, unequally covered with a pearly epidermis, which gives an ashy color. The leaves are on very short petioles, oblong, elliptic or obovate, obtuse, with a callous, whitish point, revolute on the margin, lighter beneath. The flowers hang dangling on slender strings, from one to three inches long, with an ovate bract at base, and two minute bracts on opposite sides, about the middle. The calyx-segments are appressed and acute; the corolla a broad bell, like that of the lily of the valley, with five, short, angular segments, completely reflexed. The style is as long as the corolla; the stamens, considerably shorter.

The fruit is large, bluish, rather acid, ripening late. It is rarely found in abundance; where it is procured in sufficient quantities, as in some parts of Worcester County, it is used for puddings. This species comes to greater perfection in a warmer climate. In Pennsylvania, its berries are preferred to those of any other whortleberry.

It is found in moist situations, by the side of lakes and on the edges of woods.

Sp. 3. THE BUSH HUCKLEBERRY. *G. dumosa*. Torrey and Gray.

A shrub one or two feet high, distinguished for its shining leaves, which are sessile, broad-lanceolate or obovate, wedge-shaped, acute, entire, mucronate or ending in a short, abrupt, awl-like point, conspicuously dotted *above* with resinous dots, and set, as are the recent shoots, with short, numerous, glutinous hairs, which, on the margin, give it a ciliate appearance. The stem and older branches are covered with an ash-colored, roughish bark; the recent branches are brownish, downy and somewhat viscid with a few glandular hairs. Racemes of five flowers, leafy, covered with the same glutinous hairs. Each pedicel proceeds from the axil of an oval leaflet, and is furnished, about its middle, with one to three bractiolæ. The segments of the glandular calyx are rather large, somewhat acute, and fringed. Corolla large, wax-white, often with a tinge of pink, rounded or funnel-shaped, remarkable for its five prominent, keel-like angles, with the segments obtuse and recurved. Anthers very long, brown, cleft nearly to their base into two needle-like threads, resting on the top of a short, fleshy, white filament. Style as long as the corolla. Berries large, black, crowned with the persistent calyx.

Found at Manchester, rare. Flowering in July.

Sp. 1. THE DEER BERRY. *Vaccinium stamineum*. L.

A bush about two feet high, with numerous, slender, tapering, somewhat downy, green branches, which afterwards turn brown. The leaves are oval or elliptic, often somewhat heart-shaped at base, acute at the end, slightly revolute on the margin, conspicuously veined, glaucous and somewhat downy beneath, on very short, downy footstalks. The largest are two inches long and one broad. The flowers are conspicuous for their very long, straight anthers, projecting far beyond the

short, spreading, white corolla, with pointed lobes ; at the base of each flower-stem is an ovate leaf, much smaller than the other leaves. Berries greenish, afterwards white, pear-shaped. Found at Southampton lead mine (Oakes), and elsewhere, in the western part of the State. Flowers in May and June, and ripens its scarcely eatable fruit in September.

Sp. 2. THE HIGH BUSH HUCKLEBERRY. SWAMP HUCKLEBERRY. *V. corymbosum*. L.

See our Plate.

A shrub from four to eight or nine feet high, forming large, handsome clumps in swamps and moist woods, and maturing its fruit later than the upland species. It is crowded with irregular, straggling branches, which are downy and somewhat angular when young. The bark on the branches and stem is of a bronze or copper color, bleached, where exposed to much light, to a gray. It gradually becomes rough, and cleaves off. On the smaller, it is yellowish green, clouded with dark purple, and closely scattered with whitish dots. The leaves, at the time of flowering, are narrow, lanceolate, egg-shaped or inversely egg-shaped, or elliptic, and often very downy beneath, and pale green or purplish. They afterwards become much broader, without increasing in length ; smooth on both surfaces, but somewhat downy along the midrib and often on the primary veins, of a soft green, paler beneath. The short, flower-bearing branches, the growth of the previous year, are nearly leafless. The flowers are crowded towards the extremity, pendent or nodding, in short racemes, on stems one quarter or one third of an inch long. At the base of each stem are from one to three yellowish, membranous bracts, the middle one broad, hollow, rounded. The segments of the calyx project a little, are rather acute, and glaucous, with a reddish edge. The corolla is very large and showy, white, often tinged with purple, nearly cylindrical, contracted at the mouth, with tooth-like, spreading segments. The filaments are hairy, as long as



HAMP HUCKLEBERRY (*Vaccinium corymbosum*.)

BLUE HUCKLEBERRY. (*Vaccinium virgatum*.)

the anthers. The anthers are attached above the base, the terminal distinct tubes opening towards the top obliquely. The berries are large, black, with a bluish bloom, sweet, with a very agreeable acidulous taste. The flowers appear in May and June, and the fruit ripens in August and September.

There are many varieties, differing in the size of the bush, which changes according to the soil, and in the size and color and shape of the corolla.

The BLACK SWAMP WHORTLEBERRY, (*V. disomorphum* of Michaux and Bigelow,) has leaves smaller and later; corolla much smaller and crowded, and berries very black and shining, crowned with an erect calyx; a variety with narrower and more acute leaves, with glandular serratures.

Sp. 3. THE BLUE HUCKLEBERRY. *V. virgatum*, Muhlenberg.
V. vacillans, Gray.

A shrub from one to three feet high, distinguished for the soft, light green of its leaves. Branches approaching to straight, or less crooked than in the previous species. Bark of the twigs yellowish green, sometimes clouded with dark purplish, very closely set with whitish dots, sometimes warts. Leaves on the lower, lateral branches sessile, broad elliptic, or obovate, wedge-formed, with a brown acumination; waving, reflexed, often obtusely denticulate, smooth, of a light green, often purplish, with a glaucous tinge, lighter beneath. Flowers on terminal and lateral branchlets, above the leaf-branches, on racemes, with few or no bracts, or fugacious or very minute bracts. Teeth of the calyx rather acute, standing out, often red. Corolla ovate or cylindric, yellowish white, often tinged with red, with spreading segments. Filaments shorter and less hairy than in the last.

This is a common species, growing on high ground, and most luxuriantly in the openings in rocky woods. The fruit is very

sweet, the berries large and covered with a light bluish bloom. The flowers are much more richly colored than those of other species, and the plant has a more elegant appearance. It is distinguished from any variety of the last species, by the veins and ribs of its leaves being usually perfectly smooth. It is distinguished at once from the next species, by its pale green leaves, and by being twice as high or more. The fruit branches are two or three inches long or more, without leaves, sometimes several together on a stem, so that a large part of the plant seems leafless, but covered with fruit. The flowers open in May and June ; the fruit is ripe in August.

Sp. 4. THE LOW BLUEBERRY. *V. Pennsylvanicum*.

Lamarck.

See our Plate.

A very low and much-branched under-shrub, covering the ground in extensive beds, on open, level pastures or in high pine woods. The branches are a little angular, with the bark of a light green, closely set with white, raised dots, and with a hairy line running down on each side. The leaves are sessile, oval-lanceolate, acute at both ends, thin, finely serrate, shining on both surfaces, with the margin and midrib hairy under a microscope. The fascicles of flowers are terminal, or on the upper part of the branches, while the leaves are below. The bracts are often scarlet. The teeth of the calyx are green, acute, and spreading ; the corolla is white, often with a reddish tinge ; style equalling or surpassing the corolla ; filaments short, rather hairy. The berries are blue, with a glaucous bloom, and very sweet.

From its situation and exposure, the berries ripen earlier than those of any other species. They are soft and easily bruised and injured in bringing to market, and liable, when in mass, to speedy decay. They are, therefore, less valued in market than those of some other species, though they are very delicious and not liable to the objection which is made to the

black whortleberry on account of its numerous, stony seeds. They are particularly suited to be preserved by drying, and, when prepared in that way, are equal in value to the imported currants, as an ingredient in cakes and puddings.

There is a variety of this whortleberry growing in the same situations, and forming like it large beds, distinguished by its leaves of a darker green and shining black berries.

This lowest and earliest of the blueberries delights in a thin, sandy soil, and carpets the ground in the openings in the pitch pine woods with beds of rich, soft green, which in May and June are decked with a profusion of beautiful flowers, in July and August are loaded with delicious fruit, and in October turn to a deep scarlet and crimson. Its rich, tender fruit feeds immense flocks of wild pigeons and numberless other animals. It is a peculiar blessing to the arid and otherwise barren, sandy plains, and helps the poor inhabitants, especially in seasons of scarcity, to eke out their bread-corn, to which it makes a wholesome and most agreeable addition.

Sp. 5. THE COWBERRY. *V. vitis idæa*. L.

This plant, so far as I know, occurs in only one spot in Massachusetts, which is in a pasture in Danvers, where it was found by Mr. Oakes in 1820 or before. It has some resemblance to the cranberry; but the leaves are larger, and the branches larger and shorter. It has a creeping, woody root, with ascending angular branches a foot or more long. The leaves are coriaceous and shining, like those of box, but darker. The flowers are pale pink, four-cleft, and with eight stamens. The berries are blood-red, acid, and austere. In the north of Europe, where it abounds, it is used as the cranberry, but is inferior; formed into a jelly, it is thought superior to currant jelly, as a sauce for venison or roast beef, or as a remedy for colds and sore throats.

XXI. 2. THE CRANBERRY. *OXYCOCCUS*.
Persoon.

A genus of three North American species, one of which is also European, of creeping or rarely erect plants, with small, alternate, evergreen leaves, and red berries of a pleasant, but extremely acid, taste. The calyx is four-toothed; the corolla has four long, narrow, revolute segments; the stamens are eight, with tubular, two-parted anthers; the berry is four-celled and many-seeded. The erect species grows on the highest mountains of Carolina, and bears transparent, scarlet berries, of an exquisite flavor; the other two species are found here.

Sp. 1. THE COMMON CRANBERRY. *O. macrocarpus*. Pursh.

Figured in Barton's North American Flora, I., Plate 17, and in our Plate.

Stem prostrate, creeping, near the surface of the earth, to the distance of two or three feet, and throwing out numerous, thread-like roots. Flowering branches erect, with flowers and fruit from the lower part of the shoot, or sarmentose, and erect at the extremity, the bark on the older shoots shivering off in threads, smooth, or sometimes downy, recent ones light brown.

Leaves on very short footstalks, oval, oblong, entire, or with distant, indistinct teeth, sometimes minutely downy at the end when young, revolute at the margin, green above, whitish beneath, seldom half an inch long. Flower-stalk thread-like, in the axil of a shortened leaf, an inch long, reflected at the end, downy, with two small, ovate, pointed bracts at the flexure, beyond which the footstalk is more attenuated, downy, and green.

Flowers nodding, calyx short, persistent; corolla pale-red, very long, revolute; anthers projecting, very long, somewhat

downy below, divided above into two tubes, which open by a somewhat oblique pore.

Fruit of a bright scarlet color, globular or pear-shaped, with the four blunt teeth of the calyx adhering to it; four-celled, with numerous seeds attached to the central division. It often remains on the vine through the winter, so that it is not uncommon to find flowers and mature fruit on the same plant.

The cranberry is found in every part of the State, in large beds, in boggy meadows. The berries are gathered in great quantities, and used for making tarts and sauce, for which purpose they are superior to any other article, especially as they have the advantage of being kept without difficulty throughout the winter. Their quality is much improved by being allowed to become perfectly ripe on the vines. Great quantities of the berries are exported to Europe.

Found from the Arctic sea-shore to New Jersey, and from Newfoundland to the Rocky Mountains.

Sp. 2. THE EUROPEAN CRANBERRY. *O. palustris*.
Persoon.

This plant, which has been found by Mr. Oakes on Nantucket, in Pittsfield, and near Sherburne, has so near a resemblance to the common cranberry, that it would be taken by most persons for a small variety of it. It is distinguished by its very small, *pointed* leaves, rarely a fourth part of an inch in length, and the short *ovate* segments of the corolla. It is the common cranberry of the north of Europe, where it grows in turfy, mossy bogs, particularly on mountains. Its berries are applied to the same purposes as our cranberry, and great quantities are sent from Russia to the more southern countries.

XXI. 3. THE MOUNTAIN PARTRIDGE BERRY.
CHIOGENES. Salisbury.

A North American genus of a single species. "The limb of the calyx is four-cleft; the corolla broadly campanulate, deeply four-cleft; stamens eight, included, inserted into the margin of the even disk; filaments very short and thickened, ovate, glabrous; anthers of two ovate-oblong cells, fixed by the base, not awned on the back; each two-cuspidate at the apex, and opening longitudinally along the inside from the summit to below the middle. Ovary four-celled, free only at the convex summit; style slender. Fruit white, crowned with the limb of the calyx, four-celled, many-seeded." — A. Gray:¹ *from the manuscript of the N. A. Flora.*

C. hispida. Gray.

An evergreen plant, with a woody stem, creeping on the earth or beneath the decayed leaves, within deep, shady woods, and sending out numerous, prostrate, filiform branches, rough with appressed, ferruginous bristles. The flowers are solitary, on short, recurved stems, in the axil of a leaf, with two ovate, concave, hispid bracts. Calyx of four pointed segments, surmounting the ovary and forming a part of the succulent berry. Corolla small, white, bell-shaped, somewhat four-sided. Berry white, eatable, juicy, and of an agreeable subacid taste, with a pleasant chequer-berry flavor. The whole plant has the aromatic taste and smell of *Gaulthèria procumbens*. The leaves are about one-third of an inch long, nearly orbicular, acute at the end, rounded or acute at base, reflexed at the margin, smooth above, paler and scattered with stiff hairs beneath.

¹ I owe it to the kindness of Professor Gray that I have been allowed to copy from his manuscript the above generic description, which fixes, for the first time, the position of a plant, which, ever since its first detection, has been wandering from genus to genus, suing in vain for admittance at the gates of four old genera and two new ones, and at last obtaining, from his faithful examination of its case, a character, a habitation, and a home in a seventh.

Flowers in May and June. Mr. Tuckerman tells me that this plant is abundant on the sides of the White Mountains, where it forms, with its creeping stems, large, thin mats, beneath which, when lifted up, the pleasant berries are found in luxuriant profusion. This plant evidently takes its place between *Oxycoccus* and *Gaulthèria*; the former of which it resembles in habit, the latter in properties.

THE TRUMPET FLOWER FAMILY, *Bignoniàceæ*, a rather large family of trees, climbing shrubs, and herbaceous plants, with large, trumpet-shaped, showy flowers, contains three genera, — two Trumpet Flowers, *Bignònia* and *Tecòma*, and the Catalpa, which are somewhat extensively introduced as ornamental plants; but are not found growing naturally in this State, nor probably in any part of New England.

CHAPTER V.

PLANTS WITH THE PETALS AND STAMENS GROWING FROM THE
CALYX, EXCEPT IN CORNUS.

FAMILY XXII. THE CORNUS FAMILY. *CORNA'CEÆ*.
DE CANDOLLE.

THIS family contains trees or shrubs and perennial herbs, with opposite, rarely alternate, entire leaves, pinnately veined and without stipules, and with flowers in umbels or cymes. The calyx coheres with the two- or rarely three-celled ovary, and has a small, four-toothed border. The corolla is of four deciduous petals, growing from the top of the calyx-tube and alternate with its teeth. The stamens are four, alternate with the petals. Fruit a two-, rarely three-celled drupe, with solitary seeds, and crowned with the remains of the calyx. The plants of this family are found in the temperate and cooler regions of both continents, particularly in North America and Nepaul. None of the family are hurtful. They are generally bitter and astringent; and the bark and leaves of several, particularly of *Cornus flórida* and *C. seríceæ*, have been used with efficacy in fevers. The berries of some species, as, for example, of *C. Canadénsis*, are edible, but not very pleasant. The wood of the cornels is hard and close-grained, and is used in Europe for cogs in mill-wheels, and for other small articles formed by the turner, and, in this country, as a substitute for box-wood. In Italy, the cornels are found excellent for hedges.

XXII. THE CORNEL. *CORNUS*. Tournefort.

Shrubs or small trees, with entire, deciduous leaves, minutely rough with appressed, bicuspidate hairs, and white, or, rarely, yellow, flowers. The trunk is sometimes subterraneous,

throwing up annual, herbaceous branches. There are about twenty species, of which nine or eleven are, according to Torrey and Gray, found in America, north of Mexico, two are found in Mexico, three in Nepaul, one in Japan, two are common to Europe and Asia, and one is found in all the northern parts of both continents. The bark is very bitter and tonic. Hardy plants, some of them highly ornamental, easily propagated by seed, by suckers, or by layers or cuttings.

SECTION FIRST. — *Flowers in cymes, without an involucre.*

Sp. 1. THE ALTERNATE-LEAVED CORNEL. *C. alternifolia*. L.

See our Plate.

A beautiful shrub, six to eight feet high, sometimes a graceful small tree of fifteen, twenty, or even twenty-five feet, throwing off, at one or more points, several branches, which, slightly ascending, diverge and form nearly horizontal, umbrageous stages or flats of leaves, so closely arranged as to give almost a perfect shade. It is distinguished from the other species by having its leaves and branches alternate. Recent shoots of a shining light yellowish green, with oblong, scattered, lenticellar dots. The older branches of a rich, polished green, striate with gray; the striæ at last occupying almost the whole surface, and only at intervals allowing the then purple bark to shine through. Leaves alternate, on long, round, channelled footstalks, oval or elliptic, acute or wedge-shaped at base, with a long acumination, entire, somewhat revolute at the margin, dark green, shining, deeply channelled above, glaucous or hoary, with silken, bicuspidate hairs, beneath.

Flowers in an irregularly branched head or cyme; the partial footstalks not rising from one point, as in others of this genus, but alternate and very unequal; calyx with four very minute teeth, and, like the pedicels, hairy. Corolla of four oblong, pointed, white or pale yellow, reflexed segments; stamens four, longer than the corolla, large, tapering, with

yellowish white anthers; style short, with a capitate stigma. Fruit blue-black.

A beautiful plant, with a great variety of character. It grows naturally in moist woods or on the sides of hills; but, when cultivated, flourishes in almost every kind of soil, and even in very dry situations. It flowers in May and June, and the fruit ripens in August, and, being eagerly sought for by the birds, is all gone before October.

It is sometimes five inches in diameter. It is found from Canada to Carolina, and westward to Kentucky.

Sp. 2. THE ROUND-LEAVED CORNEL. *C. circinata*.

L'Héritier.

See our Plate.

A spreading shrub, usually not erect, from four to six, sometimes eight or ten, feet high, with straight, slender, spreading branches. Recent shoots green, profusely blotched with purple, and verrucose near the leaves; older shoots pale yellowish green or purplish, thickly dotted with prominent, wart-like dots, or sometimes smooth. Branches opposite, spreading at a large angle, yellowish green, blotched and clouded with purple.

Leaves opposite, nearly round, with an abrupt acumination, rather rough, with very deeply impressed veins above, glaucous beneath with whitish down, veins very prominent. The lower and terminal leaves on the fertile stems are very large, four or five inches long and nearly of the same breadth; the upper leaves smaller and less orbicular. Flowers in terminal, open, spreading, rounded cymes, on rather short, downy stalks. Petals lanceolate or egg-shaped, pointed, white; style short, stout, green, persistent, with a capitate stigma. Fruit blue, turning to a whitish color. It flowers in May, and its fruit ripens in September, scattered on the branches, as many of the ovaries remain undeveloped.

Found from Canada to the mountains of Virginia.



Arague, del

Armstrong & Co. lith. 166 Congress St. Bos.

1 ALTERNATE LEAVED CORNEL. (*Cornus alternifolia* .)

2 PANICLED CORNEL. (*Cornus paniculata* .)

Sp. 3. THE RED-STEMMED CORNEL. *C. stolonifera*.

Michaux.

A handsome plant, conspicuous at all seasons of the year, but especially towards the end of winter, for its rich red, almost blood-colored, stems and shoots. The main stem is usually prostrate upon the ground, beneath withered leaves, throwing down roots and sending up slender, erect branches. These sometimes rise to the height of eight or ten feet, but usually five or six. The bark is smooth, of a dark purplish or sanguine red, sparsely scattered with large, brown, wart-like dots. The leaves are large, ovate, rounded at base, suddenly tapering to a short point, roughish on both surfaces, whitish beneath.

The fruit is white or lead-colored. Nuttall says, "The fruit of this species, though bitter and unpalatable, is eaten by the savages of the Missouri, from whence it (the plant) seems to extend across the continent and appears again in Siberia." Torrey and Gray show that the Siberian plant is another species, *C. alba*.

It occurs plentifully in swamps in Berkshire; and is found from Newfoundland, through Canada and the Northern States to latitude 42°, and west of Ohio. — *Fl. N. A.*, I., 650.

Sp. 4. THE PANICLED CORNEL. *C. paniculata*.

L'Héritier.

See our Plate.

A slender plant, from four to eight feet high, growing by the borders of fields and woods, in dry situations, and along the banks of streams and on hill-sides, and making a beautiful appearance when in flower. It has an upright stem, and slender, erect, opposite branches, covered with a grayish bark. The recent shoots are of a pale yellowish green, with a brown

tinge, sparsely dotted with brown. The leaves are opposite, ovate-lanceolate, tapering at base, and ending in a fine long point, on short footstalks doubly channelled above. On both surfaces are visible, with a magnifier, numerous close-pressed, minute hairs. The under surface is whitish. The cymes or heads of flowers are very numerous, on long, slender, pale yellow stems, with irregular branches. The calyx-tube is covered with a white, silky down, and ends in minute, recurved, hairy teeth. The margin of the ovary, which fills the cup, is purple or red. The petals pointed, lance-shaped, white. Stamens erect, white. Style cup-shaped. The fruit is pale white, small, depressed, globose, like an apple, the short style standing in the terminal cavity.

Flowers in May and June. Fruit matures in August and September, when the fruit-stalk is of a delicate pale scarlet.

Sp. 5. THE SILKY CORNEL. *C. sericea*. L.

See our Plate.

A showy, erect plant, somewhat spreading, growing along the banks of streams, and in wet meadows and on moist hills, by fences, five to ten feet high. The branches and upper part of the stem are purple, sprinkled, on the older stocks, with rusty gray, and often entirely gray or brown. Recent shoots green, or purplish green, and, with the leaf and fruit-stalks, usually invested with a silky down, especially above, but sometimes almost smooth.

The leaves are opposite, two or three inches long, sometimes more, but less than half as broad, ovate-lanceolate, oblong or elliptic, rounded or tapering at base, ending in a rather long point. They are dark green, entire, nearly smooth or with a few hairs above, paler, with ferruginous hairs, particularly on the midrib and veins, beneath. The footstalk is half an inch long, round, plain, and purple above, hairy. The shoots from the root are green and downy, and bear larger and rather smoother leaves. The upper leaves, particularly those next



ROUND LEAVED CORNEL. (*Cornus circinalis*.)



the flower-stalk, are very broad ; those below and on the other branches, longer and narrower.

The cymes are terminal, numerous, on round footstalks an inch or more in length, silky or downy, flat or hollow above, not large. Calyx oblong, downy, with long, lanceolate, acute, greenish segments ; petals tapering, bluntly pointed, yellow without, white within. The stamens are as long as the petals, or longer, bearing large anthers. The style, which proceeds from a purple ovary, is large and ends in a head.

But little of the fruit is matured, though, in some places, the berries, of a rich, bright blue, are usually abundant, and the clusters full. The berries, particularly the abortive ones, retain the four lanceolate segments of the calyx and the capitate style.

The bark of the silky cornel possesses, according to Dr. Barton, the same properties as that of the Flowering Dogwood, and has often been successfully used as a substitute for Peruvian bark.

This plant is very abundant in the neighborhood of Boston and in the middle of the State. It occurs from Canada to Georgia and Louisiana. It flowers in May and June, and ripens its fruit in September.

SECTION SECOND. — *Trees, with flowers in heads, surrounded by whorls of colored, petal-like leaves.*

Sp. 6. THE FLOWERING DOGWOOD. *C. florida*. L.

Fruit and leaves figured in Abbott's Insects of Georgia, II., Plate 73. Represented in Audubon's Birds, in flower, I., Plate 8 ; in fruit, I., Plate 73 ; the leaves, II., Plate 122. Michaux, Sylva, leaves, flowers, and ripened fruit, I., Plate 48. Bigelow's Medical Botany, Plate 28.

The Flowering Dogwood is the most beautiful and showy of its genus. The flowers are very numerous, and, when they are expanded in May, the tree is conspicuous at a great distance, shining through the woods, or showing like a flower among the green, delicate foliage. It is a round-headed, small tree, usually twelve or fifteen feet high, but often rising to

twenty-five or thirty, with a diameter of nine or ten inches. The recent shoots are of a grayish or purplish green, covered with a fine, soft, dusty down; those of the previous year are purple, marked with rings, afterwards becoming a light gray, which, in the larger branches, is closely striate with brown. The stem is rough, with short, broken ridges, produced by crooked furrows, between which the bark is sometimes divided in a somewhat regular manner into small, square, polygonal, or roundish plates.

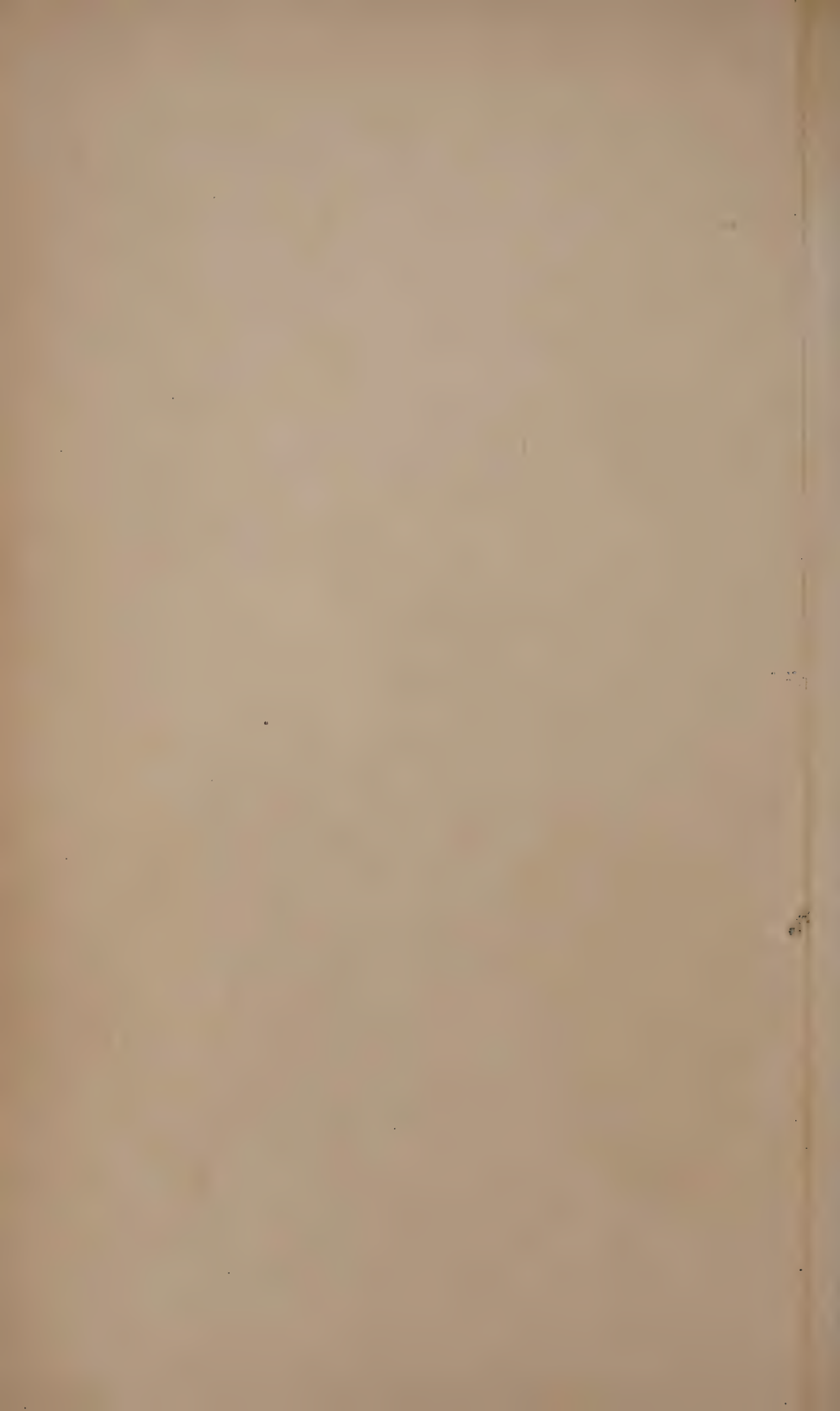
The leaves are large, four or five inches long, and two or three wide, of a round-oval form, with an abrupt, prolonged termination, and abruptly tapering at base to a short, channelled footstalk. They are entire, smooth above, with depressions at the nerves, whitish beneath, hairy along the midrib and veins, and with scattered, bicuspidate hairs between.

In May, or in the beginning of June, it is decked with a profusion of large, showy, white flowers, forming a striking ornament of the early summer woods.

The flowers are at the ends of the branches, supported by a club-shaped footstalk. They are twelve or more in a head, surrounded by a whorl of four large, floral leaves, usually taken for the flower and constituting its principal beauty. Each floral leaf is petal-like, nerved, obovate, wedge-shaped at base, rounded at the end, and notched by the elevation of the hard, colored point, about which is often a shade of flesh-color or purple. The individual flowers are very small, sessile, crowded on a common receptacle, with a few minute, rounded scales at their base. A calyx of one green piece, investing the ovary and ending in four obtuse teeth, contains four slender, reflexed, oblong, fugacious, greenish-yellow petals, four erect stamens with oblong anthers, and a persistent, capitate style, somewhat shorter, rising from a brownish, circular disk.

The fruit is in bunches on the enlarged, club-shaped footstalk, of a bright scarlet, oblong-egg-shaped, crowned with the dark purple calyx. They are bitter and unpleasant; but, when touched by the frost, help to furnish food to the robin





and other birds that remain with us during winter. At the time of maturity, they appear in the fork of two opposite branchlets, which end in the casket-shaped flower-bud of the succeeding year.

The leaves early begin to change to a purple, which turns to a rich scarlet or crimson above, with light russet beneath, or to crimson on a buff or orange ground above with a glaucous purple beneath. These, surrounding the shining scarlet bunches of berries, make the tree as beautiful an object at the close of autumn as it was in the opening of summer.

The Flowering Dogwood is of slow growth, and the wood is hard, heavy, and solid, of a fine, close texture, and susceptible of a beautiful polish. It is often called box-wood, and is employed as its substitute, and for the handles of chisels, hammers, and other instruments, and for the cogs of wheels, and other articles made by the turner.

The bark is very bitter, with something of an aromatic taste. According to Dr. Bigelow, it acts on the human system as a tonic, an astringent, and an antiseptic, approaching in its effects to the character of the Peruvian bark. For this it has been substituted and employed with great success in the treatment of intermittent and other fevers.

From the bark of the smaller roots the Indians obtained a good scarlet color. The smaller branches, stripped of their bark and used as a brush, are said to render the teeth extremely white.

SECTION THIRD. — *Plants with herbaceous stems, and flowers in an umbel-like cyme, surrounded by a petal-like involucre.*

Sp. 7. THE DWARF CORNEL. BUNCH BERRY.

C. Canadensis. L.

Figured in Audubon's Birds, II., Plate 164.

A handsome, humble plant, growing in low, damp woods and in swamps, conspicuous in May and June for its showy,

white flowers, and in autumn for its round bunches of red berries.

Stem simple, erect or ascending, four to six inches high, from a creeping root, square, the membranous projection of the angles being formed by the decurrent bases of the leaves. Leaves opposite, in alternate pairs. Near the root they are thin, narrow, clasping, membranous. At the surface is a pair of bract-like, purplish, pointed scales, with veins of deeper purple, one quarter to half an inch long. Above is a larger pair, and at the top is a pair still larger, in whose axils are two pairs of smaller leaves. All these upper ones are nearly sessile, rhomboidal, tapering rapidly to a point at each extremity, entire, ribbed, or veined, somewhat hairy above, shining and of a lighter green beneath. Flowers numerous, very small, in a terminal umbel, surrounded by four white, roundish, rhomboidal, or broad-ovate, pointed, nearly sessile, expanded bracts, resembling petals. Calyx with four, minute teeth. Corolla with four, oblong, pointed, revolute segments. Stamens four; diverging, bearing white anthers. Style as long as the stamens, purple, surrounded by a dark purple disk. The scarlet berries are well known to children, being pleasant, but without much taste. They are sometimes made into puddings. But their chief value is to the birds, as they seem not to be affected by the frost, and remain on the stem into the winter.

FAMILY XXIII. THE WITCH HAZEL FAMILY. *HAMAMELACEÆ*. LINDLEY.

A family embracing shrubs of Madagascar, Japan, the Cape of Good Hope, China, and North America; an iron-wooded tree of Persia and the Caucasus; a poplar-like tree of India, and a tree with the aspect of a cherry-tree, of Assam. Alternate, deciduous, feather-veined leaves; a bark often sprinkled with stellate pubescence; deciduous stipules; small, axillary or terminal, white or pale yellow, flowers; a calyx four- or five-cleft; petals sometimes wanting, sometimes four or five, spirally convolute in the bud, alternate with the calyx-segments, linear, deciduous; eight or ten stamens, four or five fertile, alternate with the petals, with anthers opening with a valve sometimes deciduous, four or five scale-like and sterile (perhaps petals); ovary, adhering to the calyx, two-celled, with usually solitary seeds, and two styles; a leathery or woody, two-beaked, two-celled capsule are its characteristics. A single American genus, *Eothergilla*, wanting petals, has fragrant flowers, with numerous fertile stamens. Properties unknown. There is a single genus in Massachusetts.

THE WITCH-HAZEL. *HAMAMELIS*. L.

Involucre three-leaved, three-flowered. Calyx deeply four-parted, invested with two to four roundish scales. Petals four, linear, spirally involute in the bud; stamens four, alternate with the petals; anthers opening with a lid; scales four, anther-like, opposite the stamens; capsule woody, two-horned, with one black, shining seed in each of the two cells, opening at top by two elastic valves. Flowers sterile or fertile on one or different plants.

THE COMMON WITCH-HAZEL. *H. Virginiana*. L.

Figured in Barton's Flora, III., Plate 78. Catesby's Birds, Plate 102; and in our Plate.

"The variegated appearance of the American forests during the months of autumn," says Dr. Bigelow, Fl. 61, "has been repeatedly noticed by travellers. Among the crimson and yellow hues of the falling leaves there is no more remarkable object than the witch-hazel, in the moment of parting with its foliage, putting forth a profusion of gaudy, yellow blossoms, and giving to November the counterfeited appearance of spring. It is a bushy tree, sending up a number of oblique trunks, about the size of a man's arm or larger."

The union, on the same individual plant, of blossoms, fading leaves, and ripe fruits, not very common in any climate, and occurring in no other instance in ours, led Linnæus to give to this American plant, a Greek name significant of the fact of its producing "flowers together with the fruit."

The witch-hazel is usually found within or on the borders of moist woods, or among the scattered trees and shrubs which often clothe the steep banks of small streams. It rises to the height of from ten to twenty feet. In Essex woods, Mr. Oakes pointed out to me one which exceeded twenty-two feet, and was ten inches in circumference. The stem, which is seldom erect, is covered with a brownish, ash-colored, rather smooth, bark; the branchlets of a lighter brown, with orange dots. The branches are long and pliant, with an upward curvature. The secondary branches are regularly alternate and lateral, those at the distance of one third its length from the end of a branch being longest. The leaves are lateral and alternate, or collected in tufts on the ends of the branches. They are on very short footstalks, not more than one eighth or one seventh of their length; irregularly obovate or rhomboidal, inequilateral, the lower side larger, lower on the stalk, and half-heart-shaped, the upper side narrower, and rounded



WITCH HAZEL (*Hamamelis virginiana*)

or wedge-shaped at base ; acuminate, irregularly toothed or sinuate, the four or five principal veins on each side forming large teeth, downy, at last smooth above, with a ferruginous, stellate pubescence on the midrib, footstalk, and veins beneath, the upper surface a dull green, the lower brighter and more shining. Stipules lanceolate, acute, coriaceous, half as long as the footstalk. At the time when the flowers are expanding, the leaves become of a delicate leather yellow.

The flower-buds are already formed in August. The flowers expand, sometimes as early as September or as late as April, but usually in October or November, and stand, three or four together, nodding on the end of a brown, downy footstalk, one quarter or one third of an inch long, in the axil of the falling or fallen leaf, from an involucre of three to five, round, concave, russet, downy scales. Each flower is supported by a single, dark brown, ovate scale, like the scale of a bud. Within this are two or three similar scales, or bracts, surrounding the calyx. The calyx is divided into four segments, russet and downy without, and yellow within, ovate, rounded, and ciliate. There are four, long, linear, crumpled, yellow petals, at whose base, within, are short, incurved, yellow scales. Alternate with these are the four fertile stamens, curved inwards, and with their anthers projecting on each side like wings, and opening by lids. From the centre diverge two short, slender styles, surmounting the downy, ovate ovary. The fruit, matured in the autumn, is a double nut, invested, below the middle, by the persistent, swollen, four-parted calyx. The capsular covering bursts elastically in two, disclosing the two nuts covered with shining, blackish, crustaceous shells.

The wood is white, flexible, and of a fine, close texture. The bark has the reputation of having efficacy in allaying pain, and is said to have been applied by the native Indians for that purpose to tumors and inflamed surfaces. They also applied a poultice of the inner bark to remove inflammation of the eyes.

It is found in moist woods, from Canada to Louisiana.

As it produces flowers late in autumn, and even in winter, it is deserving of cultivation. It may be propagated by layers or by seed, and it will grow readily in any tolerable soil, in a somewhat moist situation.



EUROPEAN ASH. *Fraxinus excelsior*.



FAMILY XXIV. THE CURRANT FAMILY. *GROSSULACEÆ*.
DE CANDOLLE.

This family includes only one genus, which comprehends the Currants and Gooseberries. They are either spiny or unarmed shrubs, natives of the mountains, hills, woods, and thickets of the temperate regions of America, Europe, and Asia, but unknown within the tropics, or in any part of Africa. They are found particularly about mountains. Most of the species produce agreeable, refreshing, sub-acid fruits. The Black Currant, *Ribes nigrum*, a native of Siberia and northern Europe, is cultivated for the pleasant tonic and stimulant properties possessed by a jelly made of its ripe fruit. The Red Currant, *Ribes rubrum*, found wild in the mountainous woods of Britain and other northern countries of Europe, and in the northern part of America, and the White, which is a variety produced from this by cultivation, are, in most places, justly valued for their uses in cookery, as a dessert, and as affording a cooling and wholesome drink. The common Gooseberry, *R. uva crispa* or *grossulària*, a native of the same regions, but hardly known in gardens on the continent of Europe, while the size and richness of its fruit are the pride of English, especially Lancashire, horticulture, is generally but rather unsuccessfully cultivated here for its use in tarts and pies, and sometimes as a dessert. The Missouri Currant, *R. àdreum*, has been introduced on account of the luxuriance of its growth and the beauty and fragrance of the flowers; and another from California, *R. speciosum*, which has been erected into the genus *Robsonia*, deserves to be introduced.

Fifty-three distinct species are described by De Candolle, "Prodromus," III., 477-483; sixty-six, in Don's "Gardening," III., 177-192; twenty-eight in the "Flora of North America," I., 544-553, as natives of this country, several of which latter are not mentioned by the writers above named.

Characters of the family and of the Genus. — Calyx adhering to the ovary, bell-shaped or tubular, colored, marcescent, five- (rarely four-) cleft; at length spreading or reflexed. Petals distinct, small, alternate with the segments of the calyx, and growing from its throat. Stamens alternate with the petals; anthers turned inwards. Ovary one-celled, with numerous ovules. Styles two (very rarely three or four), distinct or united. Fruit a berry, crowned with the remains of the flower, one-celled, many-seeded. Seeds suspended by long threads. Embryo minute, situated in the sharper extremity. Leaves alternate, palmately veined and lobed, without stipules, sometimes sprinkled with resinous dots. Flowers in racemes. — *Flora of N. A.*, I., 544; *D C.*, *Prodromus*, III., 477.

There are four species of gooseberry and two of currant found native in Massachusetts, of which the specific characters are taken, with slight changes, from the *N. A. Flora*, as I have not been able sufficiently to study and compare the species for myself.

Sp. 1. THE PRICKLY GOOSEBERRY. *R. cynósbati*. L.

Stems either unarmed or prickly; sub-axillary spines 1-3; leaves cordate, roundish, 3-5-lobed, more or less pubescent, the lobes cut-serrate; racemes few-flowered, the pedicels divaricate; tube of the calyx cylindrical, very broad and short, slightly contracted at the mouth; the segments reflexed; stamens and style slightly included; style undivided, hairy at base; fruit prickly or rarely unarmed. — *Flora, N. A.* 546; *Bigelow*, 91; *D C.*, III., 479.

Woods and hill-sides from Hudson's Bay to Kentucky, and west to the Rocky Mountains, and near the sources of the Platte. — *Fl.*

Sp. 2. THE COMMON WILD GOOSEBERRY. *R. hirtellum*.
Michaux.

Stems prickly or naked; sub-axillary spines usually solitary and very short; leaves roundish, cordate, 3-5-lobed, toothed, pubescent beneath; peduncles very short, deflexed, 1-3-flowered; calyx-tube bell-shaped, smooth, hairy at the throat within; the segments twice the length of the petals,

nearly equalling the stamens and 2-cleft hairy style; fruit smooth. — *Flora*, N. A., R. triflorum, *Bigelow*, 90.

The recent shoots are green, shining, brownish or ashen, afterwards, when older, dark purple, the cuticle peeling off and leaving the stem unarmed. Usually three prickles are found at the base of each leaf.

Found in rocky places from Hudson's Bay to Massachusetts, and west to Lake Superior. — *Fl.*

Sp. 3. THE ROUND-LEAVED GOOSEBERRY. *R. rotundifolium*. L.

Stem not prickly; sub-axillary spines short, usually solitary; leaves roundish, 5-lobed, nearly glabrous, shining above; the lobes short and obtuse, incisely toothed; fruit-stalks slender, 1-2-flowered, glabrous; calyx cylindrical and narrow, glabrous, as well as the ovary; the segments linear-oblong, a little spreading, twice the length of the tube; filaments projecting, glabrous, twice or thrice the length of the broadly spatulate, unguiculate petals; anthers roundish; style deeply 2-parted, as long as the stamens, hairy below; fruit small, smooth. — *Flora*, N. A., I., 547.

Flowers in June. A shrub three or four feet high, with spreading, recurved branches; the spines occasionally absent. Leaves small, truncate or slightly cordate, or often a little cuneiform, at the base; the lower surface, as well as the short petioles, often somewhat pubescent. Fruit about the size of the black currant, at length purple, delicious. — *Flora*, N. A.

No native gooseberry promises so much as this. The introduced species often refuses to flourish in our gardens, even with careful cultivation. It is not perfectly adapted to our soil and climate. But this native one is; and, if the art of cultivation can make as great a difference in it as has been made in the wild European gooseberry, the fruit will be the finest of the kind in the world. The cultivated species, on its cold, northern, native mountains, is small, hard, hairy, and acerb. Cultivation points at its large, beautiful, firm, sweet, delicious fruit, as the triumph of art. This change has been produced by long and careful culture. What may not be made, by similar efforts, of a fruit perfectly suited to our climate, which, in its natural state, is pronounced delicious!

Found in mountainous and rocky places from Massachusetts

to the mountains of North Carolina, and west to beyond the Rocky Mountains.

Sp. 4. THE SWAMP GOOSEBERRY. *R. lacustre*. Poiret.

Young stems very prickly; sub-axillary spines several, weak; leaves cordate, 3-5-parted; the lobes deeply incised; racemes 5-9-flowered, loose; calyx rotate; stamens about the length of the petals; style short, glabrous, 2-cleft; ovary glandular, hairy; fruit small, hispid. — *Flora, N. A.*

In mountain swamps. Flowers in June. Stems 3 or 4 feet high. Petioles hairy. Peduncles slender, nodding, pubescent. Fruit dark purple, unpleasant to the taste. This species differs from the other native gooseberries in its many-flowered racemes. — *Flora*.

Dr. Bigelow describes it as a handsome shrub with dissected leaves. The older branches are smooth, with one or more deflexed, axillary spines. Young branches hispid, with small, reflexed prickles. Petioles slender, villous, with scattered hairs. Leaves deeply 5-lobed; the lobes cut and toothed like those of some geraniums. — *Florula*, 91.

Striking for its very deeply cut leaves.

Found in mountainous swamps from New York and Massachusetts, north to near the Arctic circle; and in the mountains of Oregon and California. — *Flora*.

Sp. 5. THE LARGE-FLOWERING CURRANT. *R. flóridum*.
L'Héritier.

Leaves sprinkled on both sides with resinous dots, sharply 3-5-lobed, sub-cordate; the lobes acute, doubly serrate; racemes pendulous, pubescent; bracts linear, longer than the pedicels; calyx tubular-bell-shaped, glabrous; the segments oblong-spatulate, about the length of the tube; style undivided; fruit ovoid-globose, black, glabrous. — *Flora, N. A.*, I., 549.

Dr. Bigelow says of it: This is a common wild currant, having its leaves generally in five lobes, toothed at the edge, and covered on both surfaces with small, whitish, glandular points, just visible to the naked eye. Petioles fringed with compound hairs. Racemes pendulous, downy, many-flowered. Calyx tubular-campanulate, with recurved segments. Petals greenish-white, straight, a little reflexed at point. Fruit black, watery and insipid. Woods. May. — *Florula*, 90.

Found in woods from Canada, in latitude 54°, to Virginia and Kentucky. — *Flora*.

Sp. 6. THE MOUNTAIN CURRANT. *R. prostratum*.
L'Héritier.

Stems reclined; leaves deeply cordate, glabrous, 5-7-lobed; the lobes somewhat ovate, acute, incisely doubly serrate; racemes erect, slender; bracts small, much shorter than the bristly, glandular pedicels; calyx rotate, the segments obovate; style deeply 2-cleft; petals spatulate, very small; ovaries and fruit clothed with glandular bristles; fruit roundish, red. — *Flora, N. A.*, 549.

Dr. Bigelow describes it: Stem procumbent, rooting. Leaves mostly five-lobed, toothed, smooth on both sides, the veins of the younger ones pubescent beneath. Racemes erect, the peduncles and germ covered with glandular hairs. Calyx hemispherical, the segments patulous, greenish, with purple striæ. Petals wedge-shaped, shorter than the calyx. Stamens converging, anthers black. Style as long as the stamens, bifid. Berries hairy.

The berries when bruised have the odor of Skunk Cabbage. — *Florula*, 90.

Found on hills and rocky places from Newfoundland, and throughout Canada, from latitude 57°, to Pennsylvania, and west to Lake Superior and the Rocky Mountains. — *Flora*.

FAMILY XXV. THE CACTUS FAMILY. *CACTACEÆ*.

Perennial, shrub-like, or arborescent plants, of peculiar appearance and structure. The root is woody and fibrous; the trunk, hemispherical or cylindrical, branched or jointed, angular, ribbed, winged or with mammillary projections, or plane; fleshy, with a thick, mostly green, smooth bark, and interspersed with few or numerous woody fibres. The leaves are usually wanting and their place supplied by bundles of thorns. The flowers, often large, splendid, and fragrant, consist of a calyx of many divisions, partly colored and petal-like, proceeding from the exterior of the ovary, and passing by imperceptible gradations into the petals, which are very numerous, and arranged spirally or in several series. Within these, and, like them, proceeding from the lining of the calyx-tube, are the numerous slender stamens. The base of the calyx is the one-celled ovary, containing a great number of ovules attached to seed-nourishing projections from the walls. The style is single, and terminates in three or more stigmas. The fruit is a fleshy, umbilicated berry, in the pulp of which the numerous seeds, enclosed in a double integument, nestle. The fruit is pleasantly acidulous, eatable, and, in its native tropical climates, grateful.

De Candolle enumerates about one hundred and eighty species, all indigenous to America, and most of them to the warmest regions, where they delight in warm, arid situations, exposed to the sun. Some species have been perfectly naturalized on the coast of the Mediterranean, and many are cultivated in conservatories, for their singularity or the extreme beauty of their flowers. A species of cactus is sometimes used in the south of Europe as a hedge. Another species, *Opuntia coccinillifera*, a native of Mexico, sustains the cochineal insect, from which is obtained the beautiful scarlet of such importance in commerce.

Some species are found on the sandy wastes at the foot of the Rocky Mountains. A single species occurs in Massachusetts.

THE INDIAN FIG. *OPUNTIA*. Tournefort.

Shrubby plants with articulated branches ; the joints mostly compressed and dilated, bearing fascicles of prickles or bristles, arranged in a quincuncial or spiral order. Flowers yellow or red, sessile, arising from the clusters of prickles, or along the margin of the joints. Stamens numerous, shorter than the petals, somewhat irritable. Berry tuberculate, often prickly, eatable. — *Flora of N. A.* Five species of this genus are found north of Mexico.

THE PRICKLY PEAR. *O. vulgàris*. Miller.

An erect or prostrate, creeping plant, with articulated stem, the joints from two to four inches long, very fleshy, and armed with tufts of setaceous spines. The flowers are large, and grow from the margin of the joints. Petals bright yellow, obovate, mucronate, much longer than the calyx. The fruit is obovate, pulpy, and edible ; the seeds numerous, small, immersed in the crimson pulp.

My friend, Thomas A. Greene, informs me that he found this plant growing plentifully at Coatue Point, a long, narrow promontory extending towards Nantucket Harbor from the east, and accessible only at low water or in a boat. It was so near the water's edge that it must have sometimes been overflowed by the sea. "It was found early in July, and was then in full flower. From its succulent qualities, it remained fresh, and continued to put forth flowers for a long time, though thrown carelessly by in the door-yard. One of the plants, after lying thus for many days, was transplanted to James Arnold's garden, and continued to live several years."

Nantucket is in north latitude $41^{\circ} 16'$, and this is the most

northerly point on the Atlantic coast at which a cactaceous plant is found growing naturally. Mr. Greene has seen the same species growing in thin soil on the rocky ledges of Manhattan (New York) Island, and it is said to be found at New Haven, in Connecticut. It is found also in New Jersey, and thence to Florida.

FAMILY XXVI. THE ROSE FAMILY. *ROSACEÆ*. JUSSIEU.

This family includes herbaceous plants or shrubs with simple or compound, alternate, serrate leaves, having two stipules at the base of each. It embraces the true Roses, from whence its name, the Brambles, Cinquefoils, Strawberries, Spiræas, and numerous other plants of a similar character.

The flowers are regular and showy, white, red, or yellow, and usually disposed in cymes or corymbs. The calyx has four, or, more frequently, five divisions; the corolla has as many petals, — rarely none, — alternate with the divisions of the calyx, and inserted on the edge of the disk which lines the calyx-tube; the stamens are distinct, numerous, usually some multiple of the petals, and inserted just below them; fruit various.

They are chiefly confined to the temperate or cold climates of the northern hemisphere, very few being found in any other part of the world. No rosaceous plant is poisonous, and many species, particularly the Blackberry, Raspberry, and Strawberry, furnish wholesome and delicious fruit. They are remarkable for possessing an astringent principle, which gives to some of the species a value to the tanner, and renders many others useful in medicine for their tonic effect, and as remedies in fever. The roots of more than one species of blackberry are well known as valuable popular medicine in diseases affecting the digestive organs. The leaves of the sweet briar and of a species of bramble have been substituted for tea, or used to adulterate tea. Under cultivation, and, indeed, in a wild state, plants of this family are remarkable for the varieties of form they assume, so that the species run into and are confounded with each other. Many of them, especially the roses, are particularly liable to the attacks of insects.

As an ornamental plant, the rose has been longer and more deservedly celebrated and valued than any other; and for the beauty and fragrance of its flowers it has still no rival.

The family is divided into several tribes.

1. THE SPIRÆA TRIBE, *SPIRÆA*, in which the fruit is a dry seed-vessel or follicle.

THE HARDHACK. *SPIRÆA*. L.

The spiræas are shrubs, or herbs from perennial roots, with alternate leaves, and white or rose-colored flowers, which are formed of a 5-cleft, persistent calyx; 5 equal petals; from 10 to 60 stamens; 5, rarely 3 or 12, ovaries, which become so many 1-celled follicles, distinct or rarely united at base, and containing from 1 to 15 seeds. There are about fifty species of this genus, many of which are hardy plants of great beauty, cultivated extensively in the gardens of Europe, and sometimes formed into hedges. The different species flower successively from spring to the end of summer. They are propagated by dividing the roots, by suckers, by layers, or by seed. The root and bark generally possess astringent and tonic properties, and are employed in medicine and in tanning. Thirteen species are found in North America, of which the following occur here: —

Sp. 1. THE NINE-BARK. *S. opulifolia*. L.

An ornamental shrub from five to seven feet high, distinguished for the abundance of its showy heads of flowers, and for its conspicuous fruit. The stem is rugged, with loose, gray bark, easily detached and scaling off. The recent shoots are somewhat angular, and green. Leaves on short footstalks, ovate, rounded at the end, usually with two large lobes about or below the middle, but often entire, doubly serrate or crenate, the serratures rounded and callous. Stipules as long as the footstalk, oblong, pointed. Flowers in nearly hemispherical



heads, on a short stalk. Each flower on a slender, downy thread. Calyx five, broad, pointed lobes. Petals round, white, with a rose tinge. Stamens very numerous, long, with short, purple anthers.

It is found from Canada to Georgia and Missouri, and as far west as Oregon and California.

This showy plant may be made to grow anywhere, in wet ground or dry, by cuttings thrust almost without care into the ground.

I have not found it growing wild in this State; but, as it is found north and south of us, it may hereafter be found here. It is much and deservedly cultivated as an ornamental plant.

Sp. 2. THE QUEEN OF THE MEADOWS. MEADOW SWEET.
S. salicifolia. L.

A smooth, slender, leafy shrub, from two to six feet high, abounding in wet, and rarely growing in dry, places. Stem of a polished copper red, lighter above, closely set with leaves below, and terminating in a roundish-head of white flowers. Leaves lanceolate or rarely obovate-lanceolate, usually acute at each extremity, sometimes obtuse, on a short and slender petiole, sharply, sometimes doubly, serrate, of nearly the same color above and beneath, thin. The terminal panicle is crowded with single, close-set flowers, above, and branches from the axils of the leaves, below, each sustaining a roundish bunch of flowers. Partial flower-stalks thread-like, with usually a slender bract at base. The segments of the calyx are acute; after flowering, they shrivel up, leaving the cup encircling the seed-vessels. The petals are rounded, usually entire, white, rarely rose-tinted. The stamens are attached, in a single row, to the outer, swollen, glandular edge of the lining of the cup. This edge is rose-colored, and the white anthers have a faint tinge of the same color, giving, together, a rosy hue to the flower. The seed-vessels are formed of five carpels, united at base, and encircled by the persistent calyx-cup. They open

from the top by the middle suture. The dry heads of the opened seed-vessels are conspicuous, rising up among the flowers of the succeeding year. The perennial root is tough and strong, running for several feet, just below the surface. Flowering from July to September.

Several varieties are described by Pursh, and in the "Flora of North America." The most common seems to be that called *paniculata* by Pursh, with considerable variations, particularly in the color of the stem and under surface of the leaf.

Sp. 3. STEEPLE-BUSH. HARDHACK. *S. tomentosa*. L.

A leafy shrub, from two to five feet high, growing in wet ground, and distinguished, in the flowering season, for its long tapering spire of purple flowers. The old stems are smooth and of a dark bronze color. The recent stems, and every other part of the plant except the upper surface of the leaves, are covered with a thick, close down, of a light rust color, varying, on the lower surface of the leaves, to white. The leaves are very thick, crowded, on very short, rather stout petioles, elliptic or oval, somewhat obtuse, coarsely and unequally serrate. The lower part of the compound panicle is made up of partial ones from the axils of the leaves. Flowering begins at the top, where the flowers are faded before those on the lower branches begin to expand. Notwithstanding this defect, the plant possesses considerable beauty. The roots are large and running. Flowering from July to September.

This plant has valuable astringent qualities, and is employed as a tonic in dysentery and other disorders of the system, particularly in those incident to females.

Both of these species are deserving of cultivation for their beauty, their flowers coming on as the spring flowers are passing, and continuing into the autumn. Cultivation improves them; the dead stems of the previous year deforming, and the roots impeding, the growth of the flourishing stocks.



2. THE BRAMBLE TRIBE, *DRYADEÆ*, in which the fruits are seed-like little nuts, or sometimes little drupes ; and, when numerous, crowded on a conical or rounded receptacle, contains — besides the Blackberry and Raspberry — Cinquefoil, Agrimony, the Strawberry, and others.

The BRAMBLES. *RUBUS*. The various species of the bramble and of the rose have been described in Prof. Dewey's "Report on the Herbaceous Plants ;" and I should not mention them, but that this report may fall into the hands of some persons who have not seen the other, and, as these plants are half ligneous, it might seem incomplete without some notice of them.

The FLOWERING RASPBERRY, *R. odoratus*, is a low shrub, ornamenting the sides of roads and paths among mountains and in moist glens, in most parts of the State, and giving a charm to many a solitary spot by its large, rose-like flowers. The old stalk is dry and scaly ; the recent shoots and flower branches, green below, reddish above, with a covering of purple, gland-bearing hairs, which continue up the footstalk and along the midrib and principal nerves, on the under surface of the leaf, and thickly invest the flower-stalk and calyx. Five principal nerves give the soft and woolly leaf five lobes, which have large, unequal teeth. The globular, unopened buds are crowned with a tassel from the five long points of the calyx. The flowering is what is called centrifugal, the bud at the end of the main stem opening first. The petals are five, large, purple, crumpled, soon fading in the sunshine. The fruit is flattish, red, pleasant, though less agreeable than that of the true raspberry. It is much cultivated for its beauty. Should be planted in a shady place.

The wild RED RASPBERRY, *R. strigosus*, not inferior to the cultivated, and very nearly like it, and the HIGH BLACKBERRY, *R. villösus*, and *R. frondösus*, and some varieties of the Low

BLACKBERRY, *R. Canadensis*, of Torrey and Gray, are delicious and wholesome fruits. They differ much in different localities. This circumstance is worthy of consideration with those who mean to attempt to improve these fruits by cultivation. The variety of High Blackberry found at Fall River and around Buzzard's Bay is superior to any that I have tasted in the vicinity of Boston. And every one who has tasted it, remembers the superior flavor of the wild Raspberry of Maine. The THIMBLEBERRY, *R. occidentalis*, is an inferior fruit; but has been, in some instances, much improved by cultivation. The BRISTLY BLACKBERRY, *R. setosus* of Bigelow, *R. hispida* of T. and G., and *R. sempervirens* of Bigelow, is of little interest.

3. THE ROSE TRIBE, *ROSEÆ*, in which numerous nut-like seeds cover the fleshy lining of the urn-shaped calyx-tube, — contains the true ROSES, *Rosa*, L., of which one hundred and forty-four distinct species are described by De Candolle.

Four species of wild rose are common in the eastern part of Massachusetts: the EARLY WILD ROSE, *R. lucida*, Ehrenberg, with very numerous varieties, found everywhere, mostly in dry places, and flowering in May and June; the SWAMP ROSE, *R. Carolina*, L., coming in flower as the last goes out, and continuing into August; found rarely except in wet ground, and distinguished by the softness and paleness of its foliage; the SHINING ROSE, *R. nitida*, Willdenow, distinguished for its shining, dark colored leaves, and the extreme prickliness of its stem, found in a few places, in low grounds; and the SWEET BRIAR, *R. rubiginosa*, with many varieties. The last was doubtless introduced, but has spread very extensively.



FAMILY XXVII. THE APPLE FAMILY. *POMACEÆ*. LINDLEY.

To this family belong only trees and shrubs with alternate, simple or compound, leaves, stipules commonly deciduous, purplish, white, or pink flowers in terminal bunches, with a calyx of five divisions, a corolla of five petals, alternate with the divisions of the calyx; stamens numerous, some multiple of the petals, growing on and within the calyx; from one to five styles, and the fruit a pome or apple with from one to five cells.

The Pear, the Apple, the Quince, the Hawthorn, the Rowan Tree or Mountain Ash, and the Wild Sugar Pear, so valuable for their fruit and for the beauty and fragrance of their flowers, give an interest to this family with which few others can vie. The wood of all the species is of a close and smooth grain, and valuable to the turner. The fruit contains a peculiar vegetable acid, called *malic* acid.

This family is almost confined to the northern temperate zone of both continents: few species are found in the southern hemispheres, and within the tropics they are found only on mountains or elevated plains.

XXVII. 1. THE THORN. *CRATÆGUS*. L.

Thorny shrubs or low trees, natives of Europe, India, and North America, with entire or variously lobed and cut leaves, deciduous. Stipules and flowers in terminal corymbs. The calyx-tube is pitcher-shaped; the petals spreading and roundish; the stamens many; the ovary with two to five cells, and surmounted by as many glabrous styles; the fruit a fleshy pome, closed by the teeth of the calyx, and containing from two to five bony nuts, each with one seed.

Many of the most beautiful and highly valued thorns are natives of North America, and four, and probably others, of

New England. Hence they have been carried to Europe, and have there, especially within a few years past, received great attention. It is found that a greater variety of beautiful small trees and ornamental shrubs can be formed of the several species of thorn than of any other kind of tree whatever. They thus give persons, whose grounds are not extensive, the means of ornamenting them with great facility. If trained as trees, they have an appearance of singular neatness, united with a good degree of vigor. And the readiness with which they are pruned and grafted renders them susceptible of almost any shape which the fancy of the owner would have them assume.

In his "Forest Scenery," I., 94, Gilpin, speaking of the English hawthorn, after some depreciating remarks, adds: "In autumn, the hawthorn makes its best appearance. Its glowing berries produce a rich tint, which often adds great beauty to the corner of a wood, or the side of some crowded clump." In a more favorable tone his editor subjoins, "We have seen it hanging over rocks, with deep shadows under its foliage, or shooting from their sides, in the most fantastic forms, as if to gaze at its image in the deep pool below. We have seen it growing under the shelter, though not under the shade, of some stately oak, embodying the idea of beauty protected by strength. We have seen it growing grandly on the green of the village school, the great object of general attraction to the young urchins, who played in idle groups about its roots, and perhaps the only thing remaining to be recognized, when the school-boy returns as the man. We have seen its aged boughs overshadowing one half of some peaceful woodland cottage, its foliage half concealing the window, whence the sounds of happy content and cheerful mirth came forth. We know that lively season,

' When the milkmaid singeth blythe,
And the mower whets his scythe,
And every shepherd tells his tale
Under the hawthorn in the dale.' "

Some of the species native to Massachusetts often take, even in a state of nature, the shape of handsome low trees. Of these, the flowers and foliage have great beauty, and the scarlet haws, which remain on into the winter, till, ripened by the frosts, they are gathered by the birds, give them an additional charm. Upon these tall species all the others, very various and many of them very beautiful, may be grafted. And not only thorns, but pears and other fruits, may be readily made to grow upon the thorn.

The wood of the thorn is of a yellowish white, heavy, close-grained, hard, and difficult to work. It is not of sufficient size for many useful purposes, and it is somewhat liable to warp. But its hardness and the beautiful polish it takes, make it particularly fit for the handles of hammers and other small tools, and for walking-sticks; and it is often used for wedges.

But by far the most important use of the thorn is for the formation of hedges. The fact that so large a number of thorn trees are natives of this State, and found flourishing in every dry situation, in almost all kinds of soil, shows that they may be used for this purpose, with as much certainty as in England or on the continent of Europe. The time has not yet come, and, in those parts which are full of stones, it may never come, when hedges will take the place of wood and of stone for enclosures, as entirely as they have in England. But in many situations, in every part of the State, they might, even now, be introduced with great advantage and great beauty. About country houses and gardens, where it is desirable to avoid the stiff appearance of close wooden enclosures, the roughness of stone, and the slovenliness of the straggling fence, a hedge of thorn is a most desirable substitute. The experiment has been successfully tried, in the vicinity of Boston, often enough to show its practicability and its advantages. And, in such situations, the hedge would answer the double purpose of a fence and a row of fruit and ornamental trees. Pears, apples, and quinces might be grafted into the

largest stocks, and the mountain ash, and the wild sugar pear, add their rich bunches of fruit in winter, and their graceful and rich flowers in early spring.

“When the hawthorn is to be raised from seed, the haws should not be gathered till they are dead ripe. As many haws contain more than one seed, they ought not to be put in the ground entire; but, if they are to be sown immediately, they must be macerated in water till the pulp is separated from the nuts; and the latter should then be mixed with dry sand, to keep them separate, and to enable the sower to scatter them equally over the surface; they should be sown in November or December, as soon as separated from the pulp. They may be sown thinly, in beds, the seeds being scattered so as to lie about one inch apart every way, and covered about a quarter of an inch. At the end of the first year's growth, the strongest of the plants may be thinned out from the beds, and planted in nursery lines; and in the autumn of the second year, the remaining plants may be taken up for the same purpose. Hawthorns ought always to be two years transplanted before they are employed for hedges; younger and untransplanted plants, though cheaper to purchase, are always the most expensive to the planter, as they require temporary protection for a longer period.” — *Loudon*, II., 840.

When the pear is grafted into the thorn, it should be done close to the surface of the ground, or even beneath it, as otherwise there is danger of the trunk outgrowing the root, and being blown over by the wind.

Sixteen species, since reduced to ten, according to Torrey and Gray, are found in North America. The following are found in Massachusetts:—

Sp. 1. THE COCKSPUR THORN. *C. crugalli*. L.

This is a singularly neat shrub, often forming a beautiful, round-headed, small tree, ten or fifteen feet in height. The trunk is erect, with a rough, scaly bark, and set with sharp



COCKSPUR THORN. (*Crataegus crus galli* .)



thorns. The branches are gray, numerous, large, nearly horizontal, and very thorny. Recent shoots of a reddish gray. The leaves are entire, inversely egg-shaped, tapering regularly from near the end to the base of the footstalk. They are rounded or pointed at the extremity, serrate, except towards the base, dark green, smooth and very shining above, paler, but smooth and conspicuously reticulated beneath.

The flowers are in irregular corymbs, with a leafy footstalk, a leaf being below each of one or two of the lower partial footstalks. The calyx-segments are long and acute. Stamens usually ten, and styles one or two. The fruit is on slender, somewhat branched stalks, dependent from the end of spurs, which are shorter than the thorns, oblong-globose, dotted with brown, crowned with the five very acute segments of the calyx.

The thorns are two or three inches long, or more, very sharp and slender, and, when young, set with a few minute leaves. Several varieties of this thorn are found or produced by cultivation.

Found from Canada to Florida, and westward to Missouri.

Sp. 2. THE WHITE THORN. SCARLET-FRUITED THORN.

C. coccinea. L.

See our Plate.

A low, round-headed, much-branched, very beautiful tree, growing naturally on rather dry, rocky hills, but found by the banks of streams and in all kinds of soil. When surrounded by other trees, it sometimes attains the height of twenty-five feet.

The trunk on old trees has a light gray, scaly bark, often rugged and knurly, and not unfrequently armed with stout thorns, especially between the lower branches. The recent branchlets are of a dark olive green, which gradually turns to a light gray. The thorns are long, pointed, and somewhat falcate, or short and stout, sometimes solitary, more frequently by the side of a short branch.

The leaves are of a soft, leathery texture, round-ovate or rhomboid or broad-elliptical in their outline, often entire, and usually wedge-shaped at base, or slightly decurrent into a slender footstalk; on the sterile branches, often heart-shaped at base; serrate towards the end, and nearly entire or more or less deeply divided, on each side, into two to four acuminate lobes; smooth on both surfaces, dark green above, lighter beneath. Flowers in May or June. The segments of the calyx are glandular-dentate; the stamens often only ten; styles three to five. The fruit is globose or pear-shaped, half an inch long, one third of an inch broad, of a bright scarlet.

Found from Canada to Texas, and westward to Kentucky.

Sp. 3. THE PEAR-LEAVED THORN. *C. tomentosa*. L.

A much branched shrub, usually eight or ten feet high, but, when surrounded by other plants, eighteen or twenty, with bark, on the branches and small trunks, of a bright reddish, polished green, or a shining brown; on the recent shoots, dotted with elliptic, raised, brown dots. The thorns are axillary, from one to three inches long, and pointed. The flowers are large and fragrant, on broad, leafy corymbs. The segments of the calyx are long and slender and glandular-serrate, and, with the flower-stem, downy. The styles are usually three. The fruit is large, orange red, pear-shaped.

The leaves are of a firm, leathery texture, rather deeply furrowed on the upper surface, large, sometimes five inches in length and three in breadth: ovoid, tapering rapidly at base into a footstalk, which is margined to the bottom; doubly serrate, sharply cut towards the extremity, which commonly ends in an acute point; downy on both surfaces when young, smooth, finally, on the upper surface, but with the veins beneath permanently covered with a short down.

This is one of our most common and hardy thorns. It is well fitted to form a part of a hedge, but is objectionable on



PEAR LEAVED THORN. (*Crataegus tomentosa*.)

account of the early fall of the leaf. It should, therefore, be mingled with sweetbriar and the buckthorn.

It flowers in May and June, and ripens its large fruit in October. Found from Canada to Kentucky.

Sp. 4. THE DOTTED-FRUITED THORN. *C. punctata*.
Jacquin.

A handsome shrub, eight to twelve feet high, rarely more, but sometimes twenty or even twenty-five. The trunk, sometimes straight, is usually contorted and zig-zag, covered with a rough, much fissured bark.

The recent shoots have the dark brown, polished bark characteristic of the thorn; the older branches are of a greenish gray, smooth, or channelled with many small grooves. Thorns commonly long and stout, scythe-shaped. Leaves inversely egg-shaped, rounded towards the extremity, and wedge-shaped at base, tapering downwards and running along in a wing upon the footstalk, almost to its very base. They are doubly serrate above, sometimes deeply cut towards the end, of a rather firm and tough texture, with furrows above the nerves on the upper surface, lighter colored and sometimes hairy beneath, especially on the veins. The fruit dark scarlet, rounded or egg-shaped, dotted with grayish dots, on footstalks which are dotted and hairy, branching, forming corymbs or heads with leaves beneath several of the lowermost footstalks. The fruit is somewhat hard and tough, but eatable and rather agreeable to the taste.

This, like several other thorns, produces a great abundance of fruit. It is ripe in September, and a small tree loaded with it continues a very beautiful object, conspicuous at some distance, for several weeks. Each haw usually contains two pretty large hemispherical stones or nuts, so that a single tree often yields seed enough to produce plants sufficient for fifteen or twenty rods of hedge.

It is found, though less frequently than the white thorn, in most parts of the State, and in all situations, except, I think, very wet ground.

These four species, with many varieties, especially in the White and the Dotted-fruited, are all I have found in the State, though probably others are to be found. They would seem to promise better than any foreign species, for all the purposes to which the thorn may be applied.

One of the foreign species, the English Hawthorn, *C. oxyacantha*, distinguished for its deeply three- or five-lobed leaves and often purplish blossoms, has been somewhat extensively introduced, and flourishes perfectly well.

XXVII. 2. THE PEAR. *PYRUS*. Lindley.

A genus containing trees or shrubs with simple or compound, serrate leaves; spreading, terminal, simple or compound, cymes of white or rose-colored flowers, with awl-shaped, deciduous bracts; and fruit for the most part eatable. The calyx-tube is pitcher-shaped; the petals are roundish; styles five, rarely two or three, distinct, or somewhat united at base; pome fleshy or berry-like, five- (rarely two- or three-) celled, with two seeds in each cell.

The Apple, the Pear, the Service, the Beam-tree and the Mountain Ash, besides several less important plants, belong to this genus.

The PEAR TREE, *P. communis*, is too well known to need a description, and several writers have given directions for its cultivation in this climate. It grows rapidly, and forms a tall and finely shaped head; the fruit is agreeable and wholesome as food, and the juice forms a pleasant liquor; and it is to be regretted that this tree is not more frequently planted. Rows of the pear tree might often border road-sides and divisions of lands, with little injury to the grass or other vegetation, and

to the great relief of travellers, and the protection of orchards and gardens.

There are few in any community, certainly in ours, so lost to a sense of right, and so insensible of gratitude, as to desire to make depredations on the property of their neighbors, when their hunger may be appeased, and their taste gratified, by the fruit of trees standing by the roadside. And how much enjoyment would be given to that class, always to be found, in every country, who have no fruit trees of their own, by planting a number of such trees, in every village, and along every public road, for the very purpose of being, and being considered, public property! A more effectual and benevolent way of protecting valuable fruit trees, and preventing depredations, cannot easily be devised. On this point, Gerard, a quaint but earnest old writer upon plants, uses an exhortation, the spirit of which we hope many may be ready to adopt. "Forward," says he, "in the name of God, grafted, set, plant and nourish up trees in every corner of your ground; the labor is small, the cost is nothing; the commodity is great; yourselves shall have plenty; the poor shall have somewhat in time of want, to relieve their necessity; and God shall reward your goode mindes and diligence." — (*Herbal*, p. 1459.) Loudon says he was much struck, as every benevolent traveller of taste would be, with the lines of fruit trees which bordered all the public roads in the south of Germany, the apples and pears being bent almost to the ground with their loads of fruit.¹

The wood of the pear is of a reddish white color, heavy, firm, of a very fine and close grain, and next to box for the use of the engraver on wood. It takes a fine and permanent black stain, and can then with difficulty be distinguished from ebony, so that it is sometimes substituted for it. It is tough, not liable to warp, and fitted for the use of the turner and for

¹ From the juice of the fruit, treated exactly as that of apples is in making cider, a very delicious perry may be made, quite equal, when managed with great care, to the champagne wine of France.

the manufacture of tools. As fuel, it burns readily and vividly, and yields a great heat. The leaves and the bark afford a yellow dye.

The number of names of pears contained in the London Horticultural Society's Catalogue for 1831, was 677 (*Loudon*, p. 883). All these, it must be remarked, are varieties of a single species, the common pear; and yet all are distinguishable by the qualities of the fruit, and oftentimes by peculiarities in their leaves, modes of growth, color, and appearance.

The APPLE, *P. mālus*, is still more valuable, in every respect, than the pear, but does not form so handsome a tree. It has been longer and more carefully cultivated than any other tree, and the effects of cultivation are visible in the immense number of varieties, and in the prodigious difference between the delicious qualities of some of the choicer sorts, and the harsh, sour, and austere crab-apple produced by the same tree growing wild. It is native to all the temperate parts of Europe and Asia, and is everywhere cultivated for its fruit.

The apple flourishes in every part of New England, though, like the pear and the peach, it is liable to great fluctuations from year to year. Many people think that all these species, especially in their tender varieties, are less successfully cultivated than formerly. The change is probably not greater than is to be ascribed to the loss or diminution of the forests. The last two or three years seem to be bringing back the olden time, and make it probable that the apparent decline of some previous years is only part of a cycle, which, when completed, will bring round again the seasons most favorable to these valuable fruits. The climate seems to be subject to some such periodical change. Old and valuable varieties of this fruit and of the pear are continually dying out; and alarm is sometimes felt lest none so good shall be found to take their place. But the arts of the fruit-cultivator were never in so high a state as

at this moment; in 1836, the catalogue and the gardens of the London Horticultural Society contained upwards of 1,400 distinct sorts (*Loudon*, p. 895), and new ones are every year added.

The fruit is not only delicious and wholesome to man, either unprepared, or in the numerous forms into which it is reduced by the culinary art, but it forms a very valuable and nutritious article of food to almost all quadrupeds.

The wood of the apple tree is of a reddish or brownish color, smooth, fine-grained, and hard, but rather light. It is much used by the turner, and often made into walking-sticks. It has been found very durable, when used as cogs of wheels. On account of its smoothness and hardness, it is used to make shuttles and reeds for weaving.

The apple tree is often found growing in the forest, rising to a far greater height than when in the orchard. Stocks have been pointed out to me more than seventy feet high.

In the southern country, a small native apple tree is found, the *Pyrus coronària*, growing rarely to the height of twenty feet, bearing large, fragrant, rose-colored flowers, succeeded by small fruit. In the Middle States occurs another, *P. angustifolia*, with leaves and fruit smaller.

THE AMERICAN MOUNTAIN ASH. *P. Americana*. De Candolle.

Figured in *Loudon's Arboretum*, VI., 142.

The mountain ash is found growing abundantly about Wachuset, and in several other mountainous situations in Massachusetts, and also in low, cold, moist plains in Maine. It often grows in masses. The trunk rarely erect, but ascending, and from fifteen to twenty-five feet high. Its branches are few, solitary, and making a sharp angle with the stem. The bark is of a bright bottle green on the new shoots, growing darker on the older. The leaves are in tufts on the ends of the branches, pinnate, usually of seven pairs of leaflets and an

odd one. The petiole is dark red. The leaflets are oblong-lanceolate, unequal at base, rounded or cordate on the lower, acute on the upper, side, equally and deeply serrated, with numerous parallel nerves. The color is a soft green, paler beneath. The flowers, which expand early in June, are white; the fruit, which, like that of the cultivated Mountain Ash of Europe, *P. aucuparia*, when planted about houses, remains on during the winter, is of a dark reddish or scarlet color.

It has a strong resemblance to the imported mountain ash, but may be distinguished by its leaves and their petiole being more smooth, the bark darker, and its habit more slender. Its fruit, also, is of a darker color. When cultivated in England, it assumes a more robust appearance than the European mountain ash; so that its slender form, when growing wild, might be thought to be owing to its being drawn up by being surrounded by other trees. It has, however, the same delicate shape when exposed to the winds on the north side of the Wachusett.

From the resemblance to the European tree, so great that Michaux supposed it might be a variety, it is probable that its cultivation should be the same.

That tree is commonly raised, in England, where it is much cultivated as an ornamental tree, from the seed, which is gathered as soon as ripe, macerated in water till the seeds are separated from the pulp, and then may be immediately sown. They will, in that case, remain eighteen months in the ground before coming up. It is common, therefore, to mix the berries with light, sandy soil, and spread them in a layer of ten or twelve inches in thickness, in the rotting ground, covering the layer with two or three inches of sand or ashes, and allowing them to remain in that state a year. They are then separated from the soil by sifting, and sown in beds of light, rich soil, being covered a quarter of an inch. This should be done as late as possible in the fall. They will come up in June, and by the end of the season some of the plants will be eighteen inches high, and ready to transplant to the nursery. The

seeds should be not less than two inches apart. — *Loudon, Arb.*, 920.

The European Mountain Ash is commonly known in England by the name of Rowan or Roan Tree, and, in some districts, Witchen; and has long been considered of sovereign power against witches and evil spirits, and all their fascinations and spells. For this purpose, it was made into walking-sticks, or branches of it were hung about the house or about stables and cow-houses. In a stanza of an ancient song, quoted by the author of "Sylvan Sketches," we have

"Their spells were vain; the hags returned
To the queen in sorrowful mood,
Crying that witches have no power
Where there is roan-tree wood."

She adds, "This last line leads to the true reading of a line in Shakespeare's tragedy of Macbeth. The sailor's wife, on the witches requesting some chestnuts, hastily answers, 'A rown-tree, witch!' but all the editions have 'Aroint thee, witch!' which is nonsense, and evidently a corruption."

As the rowan-tree grows freely in the most exposed situations, it is often planted as a nurse to young trees of slow growth exposed to the sea-breeze; and it has the great advantage of not growing above a certain height, so that when it has performed its office, it does not interfere with the growth of the oaks and other trees for whose benefit it has been planted. It flourishes best in a good moist soil, in an airy exposure.

Another tree, nearly resembling our Mountain Ash, and perhaps a variety, is found in the Middle States, and called the Small-fruited Mountain Ash.

Several trees of this kind belong to Europe, some of which might be a valuable acquisition, for ornament at least, to our gardens, particularly the True Service Tree, *P. sorbus*, which is remarkable for its wood being the hardest and heaviest of the indigenous woods of Europe.

The fruit of the Mountain Ash is rather sour to the taste. It abounds in malic acid, and the juice has been used for the purpose of turning cider to vinegar.

Sp. 2. THE CHOKE-BERRY. *P. arbutifolia*. Willdenow.

Figured in Loudon, Arb., 926, Figure 646.

This is a slender, branching shrub, two to five feet high, with a grayish brown stem and whitish or reddish green, downy shoots. The leaves are one or two inches long, and half as wide as long, lance-oblong, or elliptic, oval, or obovate, tapering at base, finely and sharply serrate, with the serratures ending in a callous point, often tapering to a short point, pale and usually downy beneath when young, but becoming afterwards smooth, and of a rich, glossy, deep green above, with small, dark, purple glands on the midrib. Flowers white, with sometimes a slight rosy or purplish tinge, in terminal, compound, downy corymbs. Partial flower-stalks hairy, with slender, deciduous bracts at base. Calyx downy, segments acute, with minute glands on the edge. Petals roundish, often emarginate, concave. Filaments white, anthers purple. Ovaries five, woolly, united at base; styles smooth, straight. Stigmas capitate. Fruit a pome with five cells and ten seeds, of the size of a whortleberry, often downy, sometimes shining, dark red or reddish purple, rather dry, astringent, and sweetish to the taste.

This is abundantly found in moist, open woods, or in dry, shady woods, or along their border; and makes a handsome appearance, in little clumps, with its bunches of flowers, in May and June, and its erect, purple fruit, in autumn. If cultivated, it would probably increase in all its proportions, and would certainly form a very ornamental little shrub.

A finer and larger variety of this plant sometimes occurs, and, in certain places along the sides of wet woods, is more common than the one just described. This has been considered by Willdenow, and, after him, by Pursh, as a separate



Sprague, del

Armstrong & Co. lith. 168 Congress St B

SHAD BUSH. (*Amelanchier Canadensis*)

species, under the name of *P. melanocarpa*. There is little difference in the flowers or foliage, the latter being, however, in every part, a smoother plant. The fruit is larger, in a closer corymb, much more juicy and agreeable to the taste, and of a shining black color. It is, probably, only a variety, as individual plants occur more or less distantly removed from these two extremes, and of which it would be difficult to say to which they should be considered as belonging.

XXVII. 3. THE WILD SUGAR PEAR. *AMEL-
ANCHIER*. Medic.

Small trees, with simple, serrate, deciduous leaves, white, racemed flowers, and linear-lanceolate, deciduous bracts, distinguished by obovate-oblong or lanceolate petals; stamens rather shorter than the calyx; ovary with ten (or five bipartite) cells, each containing a solitary ovule; five styles partially united at base; pome, when matured, with three to five cells and three to five seeds. A genus of three or four species, two of them European, and one, with very numerous and marked varieties, American.

THE SHAD BUSH. SWAMP PYRUS. *A. Canadensis*. Torrey
and Gray.

Figured in Audubon's Birds, I., Plate 60; and the two varieties in our Plate.

There are two remarkably distinct varieties of this species found in Massachusetts. Both are called the Shad Bush, from flowering when the shad begin to ascend the streams. The first is also called

The JUNE BERRY. *A. botrydium*. This is a small, graceful tree, from fifteen to twenty-five, sometimes thirty, and even forty, feet high, with a few, slender, distant branches, usually growing in upland woods. The bark is of a reddish green; that of the branches and stems, of a rich purplish brown, and very

smooth. The leaves are two or three inches long and rather more than half that breadth, oval, varying from ovate to elliptic and obovate, sharply and finely serrate, usually somewhat cordate at base, and abruptly acuminate, smooth on both surfaces, or scattered with a few silken hairs, when just expanded, afterwards smooth, purple when young, paler beneath. Petioles one fourth or one fifth the length of the leaves. Stipules very slender, lanceolate, invested with silky hairs, purple or faint crimson, falling off with the investing scales of the buds. Outer scales roundish, concave; inner, lanceolate, silky; all, crimson or purple, smooth without, silky-villose within. Flowers large, in spreading, often somewhat pendulous, racemes, of from four to eight, on the ends of the branches, expanding in April or May, just as the leaves are beginning to open, with small, purple or faint crimson bracts at the base of the partial flower-stalks, and often near the flowers. Segments of the calyx acuminate, edged and lined with silky down. Petals white, linear-lanceolate, narrowed at base, three times as long as the calyx. Fruit pear-shaped, purplish, very sweet and pleasant, ripening in June, earlier than any other fruit, and much sought for by birds.

The union of the crimson or purple of the scales and stipules, with the pure white of the flowers, and the glossy, silken, scattered hairs of the opening leaves, gives a delicate beauty to this early welcome promise of the woods.

Dr. Darlington says that the fruit is considerably improved in size and quality by long culture.

A tree of this species, standing near the comb factory in Chester, measured five feet seven inches in circumference, at five feet from the ground.

The second variety has been called the SWAMP PYRUS, SWAMP SUGAR PEAR (*A. ovalis*). The leaves are oval-oblong, finely and sharply serrate, and finely acuminate, downy on both surfaces when young, very downy and white beneath; petioles, peduncles, and calyx covered with a silken down; stipules

slender, linear; segments of the calyx acute, ciliate; petals obovate, twice as long as the calyx, more persistent than in the last variety.

This is a smaller tree than the preceding, but sometimes rises to twelve or fifteen feet. It is usually, however, a shrub. It has a great resemblance to it, so that many botanists — and, among them, Dr. Torrey and Dr. Hooker — are disposed to consider it a variety of the same species. It cannot be easily determined what constitutes a specific difference, and what should be regarded as only an accidental variation. The points of distinction in this plant, however, are more numerous and more marked than are to be found between many nearly allied species in other genera. The leaves, when just opening, are completely invested, on the under surface, with a close, velvety, whitish down, while those of the *Botryapium* have only a few silken hairs; and a similar difference, not so marked, may be observed in the inflorescence. The leaves are less sharply serrated, the serratures being sometimes hardly visible. The racemes are longer, closer, and more erect than in the foregoing, and the petals of the corolla more distinctly obovate. It usually occurs in low, moist grounds, and is one of the earliest and most conspicuous ornaments of swampy woods. The fruit is more juicy and agreeable than that of the former. Still, there is not in the fruit a tithe of the difference which we observe between apples from the same orchard, and growing on trees which sprung from seeds of the same fruit.

Looked at as they are found in Massachusetts, these would, without hesitation, be regarded as two species. But when all the varieties, from the northern to the southern extremities of their native regions are examined, and found to run into each other by almost imperceptible gradations, they are very justly considered as only forms of one species. It is after such an examination that Drs. Torrey and Gray have arranged all the varieties under the one species, *A. Canadensis*. — *Flora of N. A.*, I., 473.

Dr. Hooker says (*Fl. Bor. Am. I.*, 203), that *Amelanchier ovalis*, according to Dr. Richardson, abounds in the sandy plains of the Saskatchewan, where its wood is prized by the Cree Indians for making pipe-stems and arrows; and it is thence termed by the Canadian voyageurs, *bois de flèche*. Its berries, which are about the size of a pea, are the finest fruit in the country; and are used by the Cree Indians, both in a fresh and in a dried state. They "make excellent puddings, very little inferior to plum-pudding."

This plant, as described by the different botanists, affords a striking instance of the effect produced by climate. It is spoken of by Dr. Richardson, in the cold regions where he found it growing, as quite a tree. In England, where it has been cultivated, it is a small tree. In Massachusetts, one variety is a low tree, the other a shrub. Dr. Darlington describes it, in Pennsylvania, as having a stem from two to four or five feet high; and Elliot speaks of it as occurring, very rarely, as a small shrub two to three feet high. It is a northern plant; and he probably noticed it on its very extreme southern limit.

It would be an interesting experiment, well worth trying, to ascertain how far this fruit might be improved by the same kind of cultivation which has been given to the apple. All of the apple family seem to be particularly susceptible of amelioration. And if, by a long course of improvement, this fruit should be made to differ from its original stock as much as the golden pippin differs from the sour crab-apple from which it is supposed to have been formed, there are few fruits now known superior to what it would become.

The QUINCE TREE, *Cydonia*, is always a low, crooked tree, with straggling, tortuous branches. The flowers are large and showy, so that it would be well worth cultivating for them only; and the rich golden or orange fruit, weighing down the branches in autumn, is still more beautiful. The dark leaves,

too, showing, when moved by the wind, their whitish, downy under surface, contrast agreeably with most of the other plants among which it makes its appearance in the corner of a garden.

It springs readily from seed, but is most easily and commonly propagated by layers. It may, also, be grafted upon the thorn, and thus add its beauty to the useful hedge.

It is said by De Candolle to be native in rocky places and hedges in the south of Europe. — *Prod.* II., 638.

FAMILY XXVIII. THE ALMOND FAMILY. *AMYGDALÆÆ*.
LINDLEY.

Trees or shrubs, with simple, alternate leaves, white or pink flowers, a calyx of five parts, a corolla of five petals, a single style, and fruit a drupe, or what is usually called a stone fruit. They are distinguished from the Rose and Apple Family by the fruit being a drupe, by their bark yielding gum, and by the presence of hydrocyanic acid in the leaves and kernel. The family includes the Almond tree, the Peach tree, the Apricot tree, the Plum, and the Cherry trees.

The plants belonging to this family, are, with only three or four exceptions, natives of cold or temperate climates of the northern hemisphere. They are distinguished, in their properties, from those of the two preceding families, with which they have many points of resemblance, and to which they are by some writers united, by the presence, in the kernel and leaves, of the deadly poison known by the name of prussic or hydrocyanic acid. This renders the kernels of the peach and cherry so dangerous when used as food, and gives to noyau and the other intoxicating liquors which are flavored by them, their fatal effects; and this principle, in the leaves of some species of cherry, as in the goat-killing cherry of Nepaul, and the Carolina cherry of this country, and in the leaves of our common black cherry, when wilted, renders them poisonous to some quadrupeds. This principle, however, is diffused in so slight a proportion through the pulp of the fruit, that the cherry, the peach and nectarine, the plum and the apicot, are a very delicious, and, in moderate quantities, a perfectly wholesome food.

The prunes, which we import from France, are the dried fruit of some varieties of the plum, which contain a sufficient quantity of sugar to preserve the fruit from decay, and even to yield a considerable quantity of brandy by distillation. The

leaves of the sloe and bird cherry of Europe have been used to adulterate the black teas of China, and even to take their place. Oil is expressed from the kernel of the almond, and from that of some of the plums. The bark of plants of this family contains an astringent principle, which renders it capable of being used in tanning, in dyeing yellow, and as a tonic and febrifuge in medicine. All of them yield a gum not unlike gum tragacanth or gum arabic, which is highly nutritious. It is doubtful whether it ever flows without injuring the tree; and, if the wound be not healed, the loss is at last fatal.

Plants of this family, native and introduced, are peculiarly liable to the attacks of insects. Canker-worms of one or of several species (*Phalæna* and *Anisópteryx*, Harris, pp. 461–470) often strip them of their leaves; the tent-caterpillars (*Clisiocampa Americana*, ib. pp. 372–377) pitch their tents among the branches, and carry on their dangerous depredations; the slug-worms, the offspring of a fly called *Selándria céra*si (ib. pp. 528–532) reduce the leaves to skeletons, and thus destroy them; the cherry-weevils (*Rhynchænus céra*si, ib. p. 68) penetrate their bark, cover their branches with warts, and cause them to decay; the plum-weevil (*Rhynchænus Nenuphar*, ib. pp. 75–78), deposits an egg in the plum, which causes it to become gummy, diseased, and to drop before it is ripe; and borers (*Bupréstis divaricatâ*, ib. p. 48, or the still more pernicious *Agéria exitiôsa*, pp. 331–338) gnaw galleries in their trunks, and devour the inner bark and sap-wood.

XXVIII. 1. THE PLUM TREE. *PRUNUS*. L.

This genus is distinguished by its drupe, which is ovate or oblong, fleshy, very smooth, covered with a glaucous or bluish powder; with the nut compressed, acute at both ends, smooth, and not porous or furrowed, except by a slight furrow along the margins. It contains low trees, with deciduous leaves

which are folded together in the bud, — natives of North America, Europe, and Asia, many of them thorny in a wild state. They have showy flowers, in fascicles or sessile umbels, rarely solitary, in the axils of the last year's leaves; and most of them bear edible fruits. The most highly valued cultivated plum trees are originally from the East, where they have been known from time immemorial. In many countries of eastern Europe, domestic animals are fattened on their fruits; and an alcoholic liquor called *Raki* is obtained from them, as is *Zwetschen-Wasser*, in Germany; and they yield a white, crystallizable sugar. They thrive best on calcareous soils; but will grow in any soil tolerably free and not over moist, especially with a subsoil of clay.

Most or all the cultivated plums, damsons, and gages, are varieties of the *Prunus doméstica*, L., the cultivated Plum Tree. It is characterized by having its branches without thorns, leaves lanceolate or oval, concave on the surface, usually acute; and flowers mostly solitary. It is found growing wild in elevated situations in southern Europe. — (*D. C. Prod.* 533.) This species, as also *P. insititia*, the Bullace Plum, are considered by some botanists as varieties of the Sloe Thorn, *P. spinosa*, which is usually a thorny shrub or small tree.

The wood of all the kinds of the plum is compact, close-grained, hard, and beautifully veined, and takes a fine polish. It is much valued and used by turners, cabinet-makers, and musical instrument makers, on the continent of Europe, and, in England, the wood of the sloe is used for handles of tools, teeth of rakes, and other small articles, and for walking-sticks.

Sp. 1. THE BEACH PLUM. *P. marítima*. Wanganheim.

Figured in London, Encyclopædia, 275.

Several varieties of this plum are found on Plum Island, and other islands on the coast and on the beaches, and by the roadside on the Cape, and in arid, sandy places, to the distance of twenty miles or more from the sea. It is a low shrub, with

straggling branches, two to four feet in height, growing usually in bunches among the loose stones or in the sand. The stem is of a very dark purple, almost black, erect or prostrate, with oblong, horizontal, light ashen dots. The shoots are stout, brown, downy, dotted with orange. The leaves are rather closely set, on short, downy footstalks, elliptical or oblong, or oval, acute at each extremity, serrate, rather stiff, smooth above, downy, especially on the midrib and veins beneath, with usually one or two glands near the base or on the footstalk. The flowers appear just before the leaves, along the sides, near the ends of the branches, from the axils of last year's leaves, in numerous umbels of two to six flowers. Footstalk slender, half an inch long, smooth or with minute pubescence. Segments of the calyx green, obtuse, slightly downy. Petals inversely egg-shaped, white. Fruit from half an inch to an inch in diameter, globular, varying from crimson to purple in different varieties. It ripens in August and September. Flowers in May and June. This is an agreeable fruit, and is preserved in considerable quantities by the inhabitants of Plymouth and other maritime towns, as a sweetmeat.

Sp. 2. THE YELLOW PLUM. CANADA PLUM. *P. Americana*. Marshall.

I have not found this species growing wild in Massachusetts, although, as it occurs on the north and south of us, it will probably be found here. It is often cultivated for its fruit, in the northern parts of New England, and makes a beautiful appearance in August, when the fruit is ripe and has a rich red or yellow color.

It is a small, round-headed tree, eight to fifteen feet high, with crowded, crooked, irregular branches, the older ones rough and somewhat thorny. The trunk is covered with a very dark reddish or bronze green bark, resembling that of the cherry tree; the smaller branches of a reddish bronze color. The footstalks of the leaves are short, reddish, with often two

glands on the raised border, near the expansion of the leaf. The leaves are broad ovate, oblong-oval or pear-shaped, tapering suddenly to a long point, and edged with rounded, double serratures, with a minute, shining, callous point at the extremity of each; smooth, but conspicuously impressed with furrows over the veins above; pale, and somewhat downy along the midrib and at the axils of the veins beneath. The flowers come out in April or May, in close, crowded bunches of three or four each, near the ends of last year's branches. The fruit is roundish ovoid, somewhat flattened, and with a furrow on one side, reddish orange, when ripe, with a yellowish pulp, and a thick, leathery skin. The stone is much flattened and bordered with a thin border on all sides; kernel flattened, very bitter. The fruit, which is often nearly an inch in diameter, is sometimes sweet and pleasant, but usually rather austere, and used chiefly for preserving in sugar; but much improved, both in size and flavor, according to Dr. Darlington, by cultivation. Few attempts of this kind have been made. If, they have already been rewarded by striking improvement, what might we not expect from a well-conducted series of experiments, such as those of Van Mons, continued for many years? No native fruit promises better in this respect, as it has a wider range than almost any other North American plant.

Introduced species.

WILD BULLACE TREE. *P. insititia*. L.

Figured in London, Encyclopædia, p. 273.

A bush or small tree, found on the banks of Charles River, in Cambridge, by road-sides at Cohasset, and in other places in the vicinity of Boston.

The shorter, lateral branches, often end in a thorn. The leaves are an inch or an inch and a half long, generally ovate, or ovate-lanceolate, acute, tapering at base, serrate, downy beneath. The flowers and leaves come from different buds, by which circumstance it is distinguished from the Sloe,



WILD RED CHERRY. (*Cerasus Pennsylvanica* .)

which also is naturalized in some parts of the country. The segments of the calyx are entire and obtuse. Petals white, inversely egg-shaped. The stamens are numerous. Style single, longer than the stamens. The fruit is usually round and black, covered with a yellowish bloom.

This plant was first pointed out to me by my friend E. Tuckerman, and I have since repeatedly met with it.

XXVIII. 2. THE CHERRY. *CÉRASUS*. Jussieu.

PRUNUS. Gray.

The name *Cérasmus*, derived from a town on the Black Sea, from whence this tree is supposed to have been introduced into Italy, designates a genus of about forty species, natives of all the temperate regions of the northern hemisphere. They are trees or shrubs, with smooth, serrated leaves, which are folded together when young, and white or reddish flowers, growing in bunches, like umbels, preceding the leaves, or in terminal racemes, accompanying or following the leaves. The fruit is a fleshy drupe, globose, or with a hollow at base, and containing a nearly globose, smooth nut. A few species, with numerous varieties, produce valuable fruits; nearly all are remarkable for the abundance of their early flowers, sometimes rendered double by cultivation. Ten species are found in this country north of Mexico, of which the following occur in Massachusetts:—

SECTION FIRST.—*Flowers in umbels, pedicels one-flowered, springing from the buds.*

This includes most of the cultivated cherries, and

Sp. 1. THE NORTHERN RED CHERRY. *P. Pennsylvánica*. Gray.

Figured in Michaux, North American Flora, Plate 88.

The northern Red Cherry is a small, slender tree, rising sometimes to the height of twenty or twenty-five feet, with a

diameter of six to nine inches. I have met with it in many parts of the State, and it occurs abundantly on the plains in the central counties. On the top and steep sides of Wachusett, it is very abundant. Trunk erect, covered with the greenish, brown, polished, membranaceous bark characteristic of the cherry, with ferruginous, swelling dots. New shoots and spray very slender, with bark of a lighter, reddish brown. Leaves numerous, alternate or in pairs, rarely threes, at the end of the branchlets, on short, small petioles, which are channelled above; narrow, lanceolate or ovate-lanceolate, with fine, rounded, glandular serratures, acuminate, almost folded together, and nodding at the end, of nearly the same light green above and beneath; texture, thin and delicate; secondary nerves numerous, parallel; veins finely reticulate. Flowers rather large, in nearly sessile umbels. Segments of the calyx thin, rounded at the end, turned back. Petals white, broad, inversely egg-shaped. Fruit reddish, in very short corymbs of from two to five, taking the place of the leaves at the end of last year's shoots, or in the axils of leaves on peduncles one inch long; with little flesh, very sour, and with a large stone. The fruit is not abundant, but occasionally a few branches are found completely loaded with it.

The wood is hard, close-grained, and of a reddish color, much resembling that of the common wild cherry; but as the trees are not often more than five or six inches in diameter, I know not that it would be of any considerable use. As it grows in the most exposed situations, it might probably grow readily from seed, or planted. In some parts of Maine and New Hampshire, this tree springs up abundantly on soil which has been recently laid open to the sun in clearing, and especially after it has been burnt over. There is a common opinion among the ignorant, that it springs up, without seed, in consequence of some action of heat upon the soil. If they would take the pains to examine, they would, however, find great quantities of the nuts or *stones*, as they are called, just be-



WILD BLACK CHERRY. (*Cerasus serotina*.)

neath the surface of the ground. In climbing the wild hills of those States, I have repeatedly observed, in the beds of the streams, — often the most practicable paths, — surprising numbers of the nuts of this cherry, though there were no trees of the kind within a great distance.

This tree is found, according to Hooker, throughout Canada, as far as the Saskatchewan, and from Newfoundland to the Rocky Mountains. It is found in all the New England States, but is not known beyond Pennsylvania.

Sp. 2. THE SAND CHERRY. *Prunus, pumila*. L. and Gray.

This has been found on Blue Hills, in Milton, by B. D. Greene, and rarely elsewhere in the State. It usually trails along the ground, raising its branches from three or four to twenty inches high. The branches are brownish, with transparent, grayish, outer bark. The leaf-buds are small and purple; the leaves are usually inversely egg-shaped or lance-shaped, often nearly entire or serrate, with a few indistinct teeth above, acute or rounded at the extremity, tapering to a slender footstalk, with linear, glandular-serrate stipules at base when young; pale green above, whitish beneath. The flowers, two or three together, are on slender stems, half an inch long. Segments of the calyx rounded. Petals white, rather small, inversely egg-shaped. Stamens numerous. Fruit small, dark red, eatable.

SECTION SECOND. *Flowers in racemes, terminating leafy branches.*

Sp. 3. THE BLACK CHERRY. *P. serótina*. Gray.

A tree of middling size, with spreading branches, found in dry woods, and often left growing along the roads. It is always a handsome tree, and, when young, very beautiful, nearly resembling the Portugal Laurel. The bark on the

recent shoots is green or olive-brown, polished, and dotted with minute, orange dots. It afterwards becomes darker, and, on the small trunks and larger branches, is of a reddish or purplish brown, scattered with oblong, horizontal dots, characteristic of the cherry. Old trunks have a scaly bark, not unlike that of some of the pines. The leaves are ovate or lanceolate, oblong or obovate, rounded or acute at base, gradually tapering to a point, serrate with incurved serratures, polished above, lighter and smooth beneath, with sometimes a silken pubescence along the lower part of the midrib. Footstalk half an inch long, with usually two to five tooth-like glands near the base of the leaf. In autumn, the leaves turn to a deep orange, sprinkled and bordered with scarlet and crimson. Later, they change to a pale ochre yellow.

The flowers are small, pretty closely set, by short stems, on a simple raceme, forming the end of a footstalk, four to six inches long, with two to five leaves at its base. It is erect or curved upward in flowering, which begins at the bottom; afterwards bends down with the weight of the fruit.

The wild cherry tree rarely rises, in Massachusetts, above the height of forty or fifty feet. It is found, according to Dr. Richardson, as far north as the Great Slave Lake in latitude 62°, where it attains the height of only five feet. On the sandy plains of the Saskatchewan, it rises to twenty feet. In Maine, it increases to thirty or more, and is seldom a foot in diameter. In western New York it rises to a great height and large size; but it reaches its perfection on the Ohio River, where Michaux found it sometimes from twelve to even sixteen feet in circumference, and from eighty to one hundred feet high, with a trunk of uniform size and undivided to the height of twenty-five or thirty feet.

The wood is of a light red or fresh mahogany color, growing darker and richer with age. The medullary rays, or what are commonly called the silver grain, are very numerous, and

more closely arranged than in almost any other kind of wood ; and, when cut by a plane not quite parallel to them, exhibit a beautiful appearance. It is very close-grained, compact, takes a good polish, and when perfectly seasoned, is not liable to shrink or warp. It is, therefore, particularly suitable and much employed for tables, chests of drawers, and other cabinet work, and, when polished and varnished, is not less beautiful for such articles than inferior kinds of mahogany. It is particularly valuable for window sashes, as it retains a permanently smooth surface and is little affected by the weather. In some places it is used to make the posts of stair-rails and for doors, in which it looks extremely well. Gun-stocks and other small articles are also made of it. The most beautiful portion, commonly used, is that portion of the trunk where the branches begin. This part is often equal to the better kinds of mahogany. It would be worth the experiment, to manufacture that part of the trunk which is beneath the surface of the ground. It might be found as beautiful as the roots of the black and yellow birch. The cabinet-makers of France increase the beauty of an inferior wood of this genus (the Mahaleb cherry tree) by sawing out the boards obliquely across the trunk, instead of parallel to its length. This brings out the silver-grain to advantage.

Little other use is made of the fruit than to communicate their peculiar and very agreeable flavor, by maceration, to rum or brandy ; making, what is variously called cherry brandy, cherry rum, cherry bounce, or simply cherry. Many other uses might, doubtless, be made of them. The flavor is decidedly superior to that of the cherry, from varieties of which the Kirchwasser and Maraschino of Alsace and Dalmatia are made. I would certainly say nothing to encourage the increased manufacture of intoxicating liquors. But, if they are to be made, it would be better that some fruit, now useless, should be employed for that purpose, than that the *staff of life* should be, as it now is, converted into its bane.

The bark is of a pleasant, aromatic bitter ; leaving, when chewed, an agreeable taste in the mouth. An infusion of it, in boiling water, is sometimes drunk, in place of tea, for its tonic and presumed purifying effects.

The fruit is a favorite food of many birds, and, if the tree were planted along the borders of orchards and woods, would serve as a protection to other fruit. This is, also, more than almost any other fruit tree, subject to the ravages of caterpillars ; it might thus be a further protection to cultivated trees by inviting the butterfly from them to itself.

The wild black cherry¹ prefers a dry soil, but grows in every soil, and in almost any situation. It may be raised from seed, in which case the fruit should be sown with the pulp as soon as it is ripe. It is, however, then subject to be destroyed by various animals. It may be kept in sand till spring, care being taken that it do not sprout. It may, then, be sown thin, and covered with a quarter of an inch of soil. Or it may be propagated by means of the sprouts which spring from about the trunk, near the root, taken off with a few radicles attached.

If a stone jug is filled with the ripe fruit, and any strong alcoholic liquor poured in, as much as the vessel will hold, it becomes, in a few months, a very valuable medicine in cases of the autumnal dysentery.

Sp. 4. THE CHOKE CHERRY. *P. Virginiana*. L.

A shrub or small tree, often only one or two feet high, and sometimes rising to twelve or fifteen. The trunk is dark colored, resembling an alder more than a common cherry tree : it rarely attains a diameter of two or three inches, and throws out a large number of branches, which in May are covered with flowers, and in July and August are usually bent down with a profusion of fruit. The shoots and young branches are of an ashen gray or olive green, growing darker after the

¹ *C. sylvestris*, the wild, Black-fruited Cherry of Europe.



CHOKE CHERRY. (*Cerasus Virginiana*.)

first year. The leaves are broad-obovate, oblong, or elliptic, rounded or sometimes heart-shaped at base, abruptly acuminate, sharply and finely serrate, smooth, green, and polished above, much lighter beneath, one to four or five inches long, and of two thirds that width. The footstalk is one half or three fourths of an inch long, round, channelled above, with always two, sometimes four or more, glands, a little below the base of the leaf, or at equal distances further down. Fruit-stalks three to six inches long, green, with two or three small leaves near the base. Fruit on short stems, three or four lines in diameter, dark red, pleasant to the taste, but astringent. It differs very much on different plants; being sometimes very austere, sometimes very juicy and pleasant, with little astringency. Its beauty invites cultivation.

FAMILY XXIX. THE BEAN FAMILY. *LEGUMINOSÆ*.
JUSSIEU.

The peculiar distinction of this family is, that its flowers are butterfly-shaped, or its fruits in pods; and it often possesses both these characters. By one or the other all the plants of the family are known; and the butterfly-shaped flowers are a character not to be mistaken, as they are found in no other family. It includes herbs, shrubs, and trees. The leaves, which are usually compound, rarely simple, have commonly two stipules at the base, and the branches have often projecting ribs or membranous wings. It is an immense and perfectly natural family, distributed throughout almost every part of the globe. De Candolle describes, as belonging to it, 280 genera, containing upwards of 2,600 species. Of these, 900 species are found within the tropics, nearly 1,300 north of them, and 400 south. There are, at present, in all, not less than 3,700 species.

The distinctive characters of the Family are: Sepals united into a five-cleft or five-toothed calyx; the odd segment lowest. Petals five, or, by abortion, fewer or none, either papilionaceous or regular, the odd petal superior. Stamens inserted, with the petals, into the base of the calyx, distinct or in one, two, or, very rarely, three bundles. Ovary simple, solitary, very rarely two or more, free from the calyx. Ovules solitary or several. Style proceeding from the upper suture. Fruit a legume, or sometimes a drupe. Seeds solitary or several, attached to the upper suture. Embryo straight, or with its radicle bent back along the edge of the cotyledons. Cotyledons either remaining underground in germination, or rising above and becoming green like the leaves.

Of this family, Lindley says, "It is not only among the most extensive that are known, but also one of the most

important to man, with reference to the objects either of ornament, of utility, or of nutriment, which it comprehends. When we reflect that the *Cercis*, which renders the gardens of Turkey resplendent with its myriads of purple flowers; the *Acacia*, not less valued for its airy foliage and elegant blossoms than for its hard and durable wood; the *Braziletto*, *Logwood*, and *Rosewoods* of commerce; the *Laburnum*; the classical *Cytisus*; the *Furze* and the *Broom*, — both the pride of the otherwise dreary heaths of Europe; the *Bean*, the *Pea*, the *Vetch*, the *Clover*, the *Trefoil*, the *Lucerne*, all staple articles of culture by the farmer, are so many species of *Leguminosæ*; and that the gums *Arabic* and *Senegal*, *Kino*, and various precious medicinal drugs, not to mention *Indigo*, the most useful of all dyes, are products of other species, — it will be perceived that it would be difficult to point out an order with greater claims upon the attention."

The general character of the family is, to be eminently wholesome; but to this there are some striking exceptions. The seeds, roots, and leaves of some species are poisonous. Many, as the *Cassia*, *Senna*, and others, have cathartic properties. Some of them are powerful tonics, and others, from possessing an analogous principle, are of use in tanning. A few have narcotic properties, and some contain a principle which is poisonous. Gum lac, gum Arabic, gum animé, gum tragacanth, and manna, are derived from plants belonging to this family. Many of the woods are valuable as furnishing dyes. Such are *Brazil wood*, *Logwood*, and *Sandal wood*. The most valuable of the balsams — the *Balsam of Copaiva*, *Balsam of Peru*, and of *Tolu* — flow from wounds in others; and the fragrant *Tonka bean* is the produce of a plant of the same comprehensive family.

De Candolle, in his "*Prodromus*," divides this vast family into four sub-orders, and these into eleven tribes, which are still farther divided into sub-tribes. His first sub-order is,—

THE PAPILIONACEOUS, *Papilionaceæ*, L., comprehending plants having a calyx with distinct lobes, and a papilionaceous, or butterfly-shaped corolla. These are arranged in two divisions, the first comprehending plants whose cotyledons in germination rise above the surface and become green like leaves; the second, those whose fleshy cotyledons remain beneath the surface. To this latter division belong those valuable plants, which, under the name of pulse, furnish so much food to man.

Of the first the seeds are not eaten, but it includes many valuable trees.

TRIBE I. *LOTÆÆ*.

SUB-TRIBE IV. *Galegeæ*. D. C. II., 243.

Legume one-celled. Stamens in two bundles, more rarely in one. Herbs, Shrubs, and Trees. (*Galegeæ*, Torrey, Tribe III., *Flora of N. A.*, p. 292, which also includes two genera of the sub-tribe *Clidreæ*.)

THE LOCUST TREE. *ROBINIA*. L.

A North American genus of a few species of trees or shrubs, often bearing stipular spines, with leaves unequally pinnate, the leaflets on short stems with little stipules at base. The flowers are white, rose, or flesh-colored, in showy, axillary racemes, usually pendent. The calyx has five, lanceolate teeth, the two upper shorter and cohering or approximate. The banner of the corolla is ample, the keel obtuse. The stamens in two bundles, deciduous. The style is bearded next the free stamen. The fruit is a many-seeded pod, with the seed-bearing edge margined, and with thin and flat valves.

The locust trees, particularly the common, are subject to the assaults of many insects. The leaves of the common locust serve as food and habitation to the caterpillars of the Tityrus skipper, a large, brown butterfly with honey-yellow spots (*Harris's Report*, pp. 210, 211, where is found an interesting account of the habits of the caterpillar). The bark is punctured and the sap sucked by the two-spotted tree-hopper (*Membracis bimaculata*, ib. p. 221). The pee-weevils (*Bru-*



LOCUST. *Robinia pseudacacia*.





COMMON LOCUST. (*Robinia pseudacacia*.)

chus pisi, ib. pp. 61, 62) lay their eggs in the seeds, as they do in those of the pea and other leguminous plants; and the grubs of an *Apion* beetle (ib. p. 67) inhabit the pods and eat up the seeds. The grubs of the painted *Clytus* beetle (ib. pp. 102, 411) burrow in the bark and devour the soft inner portion, in autumn, and in spring they bore through the sapwood, more or less deeply into the trunk, which they traverse by many winding and irregular, upward passages. A small reddish caterpillar (supposed by Dr. Harris to belong to one of the *Ægerian* sphinxes, or to one of the *Bombyces*, see p. 411 of his Report) lives in the pith of the small branches and trunks of very small trees. The irritation causes the twig to swell and become spongy in the parts affected, and easily to break off at these places. The large caterpillar of the locust tree, carpenter moth (*Xyleutes Robinia*, ib. p. 412) bores the tree in various directions, appearing to prefer old and full-grown trees. For full accounts of these several enemies of the locust tree, which threaten, if not checked, to exterminate the tree, I must refer to the admirable Report of Dr. Harris.

Two species of locust, besides the common, are natives of the southern parts of the country, and may be cultivated here: *R. viscosa*, the Clammy-barked locust, which is a small tree, with large, showy, pale pink flowers; and *R. hispida*, the Rose Acacia, a very beautiful flowering shrub.

THE COMMON LOCUST TREE. *R. pseudacacia*. L.

Figured in Audubon's Birds, II., Plate 104. Figured by Michaux, Plate 76.

Three varieties of the tree figured in Loudon's Arboretum, V., 71.

The locust, in Massachusetts, is never of a first-rate size or height, but is often a graceful and always and extremely picturesque tree. The trunk rises sometimes directly upwards to a considerable height without branches, sometimes inclined to one side, and very irregular and bare, sometimes, on the edge of a wood, feathering down to the ground on one side. The bark is thick, and, on old trees, very deeply and irregu-

larly furrowed with long furrows, and of an ashen or granite color. On the branches it is ash gray, and, on the slender, wand-like spray, purple or purplish green. The soft and velvety foliage is too smooth to retain the dust, and is often seen bright and clean on the side of a dusty road. While the heart of the tree is so liable to the attack of insects, that several trees are not often seen together which do not present a dead or dying limb, the leaves seem peculiarly exempt, and often show like an image of the freshness and vigor of youth, in contrast with the melancholy one of premature decay.

Flowers very fragrant and beautiful, in long pendulous racemes from the axil of the upper leaves. The partial flower-stalks half an inch long. Calyx an irregular, purplish tube, ending in two obtuse and three acute segments. Corolla white, butterfly-shaped. The lower petal nearly round, notched at the end and reflected, yellow in the middle. Side petals oblong, irregular, on a long claw, meeting below the keel, which is formed of two petals grown together and embracing the stamens; these, united, form a tube, in the middle of which is the curved style, with its capitate stigma.

The leaves are compound, the leaf-stalk channelled above, and angled beneath. The leaflets are from nine to twenty-five, on short petioles, oblong, elliptic or egg-shaped, rounded at the extremity, with a short point, smooth or silken-downy, light green above, lighter beneath. At the foot of each is a single, minute, linear stipule, about as long as the partial foot-stalk. Each leaf is folded on itself before opening, and the half-expanded leaflets are straight and parallel, like the teeth of a comb. The prickles are at the base of the leaves, short, somewhat triangular, dilated at base, sharp, dark purple, adhering only to the bark, but persistent.

The root is not large, but throws out numerous fibres, which creep extensively in every direction, just below the surface, the smaller ones often forming little tubercles. Searching thus for nutriment where it is most abundantly to be found, the tree is

of remarkably rapid growth while young. In ten years, it will reach the height of twenty or thirty feet. After that, however, except in exceedingly rich soil, its growth is comparatively slow. It would be natural to suppose that a tree whose roots run so near the surface should be exhausting to the soil, and so it is often considered. I am assured, however, by many gentlemen, that few trees are less injurious to the grass of pastures, and several persons have recommended that it should be planted on the borders of pasture land in preference to any other tree. The leaves are sweet and nutritious to cattle, and the droppings of the tree and its flowers are thought to have a favorable effect on the growth of grass.

The locust is not known to be, nor is it generally considered, a native of the State or of New England; and it is doubtful whether it grew naturally in the northern part of the Middle States. Michaux says it first occurs growing naturally between Lancaster and Harrisburg, in Pennsylvania, in the latitude of $40^{\circ} 20'$, but that, west of the mountains, it is found two or three degrees further north; and that it abounds most in the valleys amongst the chains of the Alleghany Mountains. It does not grow spontaneously near the sea-coast, even in the Southern States. It is common in all the Western States, and attains its perfection in Kentucky and Tennessee, where, in a fertile soil, it sometimes exceeds four feet in diameter and a height of seventy or eighty feet.

The wood of the locust is of a remarkably compact, close, and fine grain, the medullary rays or plates of silver grain being closer and more numerous than in almost any other tree. It varies in color in different varieties. In that which commonly grows in Massachusetts, it is of a yellowish white or straw color. In some, it is of a greenish yellow, in others, of a reddish color. This last is considered far the most valuable timber. In the Western States, it is said there is a black variety. These varieties are probably dependent on the qualities of the soil. All, however, have the properties of strength

and durability in a remarkable degree. And in these respects and in stiffness, hardness, elasticity, and weight, the best locust is superior to any northern oak. According to Barton, its strength, as compared with English oak, is as 1867 to 1672. The weight was found, at Brest, in 1823, to be one sixth greater than that of oak. Experiments made at the Royal Naval College at Woolwich, show its lateral strength in resisting fracture, to be to that of oak as 100 to 75.

As long ago as 1601 or 1635, for accounts differ, the locust tree was introduced into France from America by Jean Robin or his son Vespasian, in honor of one or the other of whom it received from Linnæus the name of *Robinia*. Since that time, it has been much cultivated in that country and in England, for the beauty of its foliage and the fragrance of its flowers. In 1823, the celebrated Cobbett, after spending some time in America, went back to England, and produced a great sensation by his writings in commendation of this tree. For some of the purposes for which he recommended it, it has been found of little value. For others, its importance is acknowledged. Where resistance to a strain is required, it is considered superior to any other wood. And the durability of the heart-wood, when employed as posts or in fences, or in other situations exposed to the weather, is ascertained to be extraordinary.

In this country, the value of the timber is almost universally known and acknowledged. In ship-building it is employed for floors and floor timber, in preference to any other timber. For treenails it is preferred to every other wood, and great quantities of it are annually exported for that purpose. In the Middle States, where it grows more freely and abundantly than here, it is valued for all uses in which strength is required, and durability, in places exposed to the weather. For posts of gates, therefore, and for sleepers, it has been found invaluable. The same has been found true in this State; and, for all such purposes, as much of it is consumed as can be obtained.

The aborigines of the south used the wood for bows, on account of its toughness and elasticity. It is used for mill-cogs and for other articles exposed to constant wear.

The leaves are used, in some parts of Europe, either fresh or cured, as nourishment for horses; the seeds are found very nutritious to fowls. The leaves may be made a substitute for indigo in dyeing blue, and the flowers are used by the Chinese for dyeing yellow.

The practice of planting this tree by road-sides and along the enclosures of pasture lands has much increased of late years, but has been checked by the fact that, in such situations, it is exposed to the inroads of an insect, whose worm penetrates to the heart of the tree and destroys its life. An unexpected remedy has, however, been suggested by the success of the late Joseph Cogswell, Esq., in the cultivation, many years ago, of a large plantation of the locust. He found that when it forms a wood, those trees only are attacked by the worm which form the outskirts, exposed to the sun and free air. Whether it is that the insect parent of the worm delights, as many do, in the sunlight, and avoids the shade of the woods, or from whatever cause, it was found that all the interior of the plantation was free from its attacks. If this conclusion should be confirmed by further experience, it will be best, whenever the tree is cultivated for its timber, to plant it in masses of several acres in extent; and to substitute, in the sunny and exposed situations which it has usually held, some of those numerous trees which flourish best in them.

No tree promises better, as a cultivated forest tree, than this. Its very rapid growth, its numerous and valuable properties as timber, and the fact, that the sap-wood is converted into heart-wood earlier than in almost any other tree, are very strong recommendations. It is the experience of many persons in different parts of the State, that the locust grows on poor land better and more rapidly than any species of hard wood. On such land, however, large, sound timber of locust cannot

be produced, and it would always be good economy to fell it within thirty or forty years; or, at least, not to allow it to grow, for timber, to a great age. The various kinds of pine are better adapted to the poorest soils. But in rich, sandy loam, locust trees of a moderate timber size may, probably, be produced with greater ease and in a shorter time than any trees possessing the same valuable properties.¹

As an ornamental tree, it must continue to be cultivated. It is true that it is liable to be broken by the wind, and that it never is full enough of branches to cast a deep shade. But the beauty of its foliage is almost unrivalled; and such pendent racemes of fragrant flowers are found on no other tree.

The locust may readily be propagated by the suckers which spring up in great numbers, to some distance, around the tree. But the readiest way is by seed. This, which is ripe in October, may be sown immediately, and will come up the following summer. Cobbett recommended that the seeds should be previously steeped in hot water. He was, however, speaking of seeds which had been sent from this country to England; but he professed to have received the suggestion from those acquainted with the cultivation on Long Island, where it has been planted more extensively than in any other part of this country. If the seed is to be kept over the winter, it should be preserved in the pod, in which it retains its vegetative power much longer than when separated.

It should be sown in a rich, loamy soil, and covered lightly to the depth of one fourth to one half of an inch. The plants will often grow from two to three or four feet high in a single season, and may be immediately transplanted, and with less of root than almost any other tree. — (*Loudon, Arb.* 624.) The most agreeable effect is produced by trees standing alone or in groups of a few together. If planted for the timber, it

¹ William Buckminster, Esq., stated in the "N. E. Farmer," of July 16, 1830, that a sprout from a young stump of yellow locust grew sixteen and a half feet in one summer; and that it is not uncommon, on good land, to witness a growth of eight and ten feet.

should be, as has already been said, in plantations of several acres.

In the same family is found the *Gleditsia*, a native of the south, one species of which, *G. triacanthus*, the Sweet Locust or Honey Locust, is sometimes found in this State, growing well in a rich soil in sheltered situations; remarkable for its triple thorns, its doubly pinnate leaves, and its pods of twelve or fifteen inches in length.

Two other trees of this family, the Kentucky Coffee Tree, *Gymnocladus Canadensis*, and the Canada Judas Tree, *Cercis Canadensis*, grow naturally as far north as this, though I know not that they have been found native in Massachusetts. Both are occasionally cultivated here as ornamental trees. The former is not remarkable for its beauty, though striking by its singular appearance. The latter, often called the Red Bud, is curious from being covered with bunches of flowers of a rose color, before the leaves begin to appear. They give a brilliant appearance to the whole tree, except the extremities of the branches, and a rich and splendid appearance to a distant forest. The leaves, which begin to come out while the flowers are expanded, are folded together, before opening, on the midrib; they are broad, heart-shaped and pointed, and very smooth above and beneath.

The Red Bud is a fine showy tree, early in the season, and not without beauty at all times.

CHAPTER VI.

PLANTS WITH MANY PETALS, WHICH GROW, TOGETHER WITH THE STAMENS, ABOUT OR UPON A DISK SURROUNDING THE SEED-VESSEL.

FAMILY XXX. THE VINE FAMILY. *VITACEÆ*. JUSSIEU.

THE Vines are trailing or climbing shrubs, with swollen, separable joints, and alternate leaves with stipules. On the side of the stem opposite the leaves, spring the footstalks which bear the clusters of flowers. When the flowers are abortive, the footstalk is changed into a tendril; and tendrils opposite the leaves are peculiar to this family. The flowers are small, greenish, and commonly perfect; calyx minute, nearly entire, five-toothed; petals five, distinct, caducous; stamens as many as the petals and opposite them, inserted on the surface of the disk; ovary two-celled, with two erect ovules side by side in each cell; style short or wanting; stigma simple. Fruit a round, pulpy berry, with one or more cells and one or more seeds. Seeds erect, with a bony shell. Embryo straight, short; cotyledons flat, lanceolate; radicle inferior. — (*Flore Française*, V., 857.) Plants of this family have acid properties and yield sugar. They are found in the woods of the milder and hotter parts of both hemispheres. There are two genera in this State: 1. the Grape Vine, *Vitis*, with entire leaves; and 2. the Virginian Creeper, *Ampelopsis*, with leaves divided into five parts.

XXX. 1. THE GRAPE VINE. *VITIS*. L.

This is a small genus, thus characterized: Calyx nearly entire; petals five, commonly united at the apex, but distinct at base and falling off like a cap; stamens five; style short, conical, stigma dilated. Peduncles sometimes changed into tendrils. Flowers, in the North American species, perfect, or



containing only stamens, or only pistils, on the same or different plants.

The wine-producing grape vines of Europe are varieties of one species, a native of the temperate parts of Asia, but introduced, at a very remote period, into Greece, and afterwards into Italy, and thence into Central and Western Europe. In its wild state it produces berries not larger than currants. The numerous valuable varieties have been produced by long-continued culture in favorable climates and soils. It flourishes best between the parallels of 30° and 45° of north latitude; but is cultivated successfully as far north as 47° , in the west of France; as far as 48° or 49° , in Hungary and on the Don; and, on the Rhine, as far as 50° . The trunk sometimes attains a great size; in rare instances, even three feet in diameter. The wood is hard, close-grained, smooth, and susceptible of a fine polish. The fruit is wholesome and nutritious, and forms an important article of food in several countries of Europe.

Most of the species of vine native with us produce no valuable fruit; but they are evidently susceptible of vast improvement by cultivation, as, in all probability, the best vines of Europe have been made so by careful, choice cultivation. Possibly, use might be made of their leaves. Sir James Hall, a distinguished experimental philosopher, father of Captain Hall, the traveller, ascertained that the leaves of the grape vine, dried in the shade, made an excellent substitute for tea. Treated like malt, they produce a liquor of a vinous quality, which forms a substitute for beer, and which may be converted into a valuable vinegar.

Four, perhaps five, species of grape vine are found in Massachusetts.

Sp. 1. THE FOX GRAPE. COMMON GRAPE. *V. labrusca*. L.

See our Figure.

This is the common wild grape of Massachusetts, and is found in every part, in rich low grounds, overspreading clumps

of bushes, climbing to the tops of trees, and embowering them with its thick and abundant foliage, or covering walls and rocks. It is easily distinguished from the other vines by the tawny down which covers the branches, leaf- and flower-stalks, and tendrils. The recent shoots are of a light green, downy, and sometimes dotted with brown dots. Leaf-stalks large, round. Mature leaves heart-shaped, five-angled, orbicular, sometimes three- or five-lobed, sinuses rounded or obtuse, lobes often acuminate; very obtusely dentate, with the teeth mucronate; smooth or slightly pubescent above; abundantly white, downy or woolly, and ferruginous along the veins, beneath; down often tawny; principal veins five, and, with the secondary veins and veinlets, prominent; young leaves with a rusty down, particularly on the nerves and veins, on both surfaces. Tendrils slender, once or twice divided. The racemes of flowers are short, with usually one short branch, the flowers crowded in umbels.

The fruit of this vine varies much in size, color, and time of maturity, as well as in taste. The berries are from one half to three quarters of an inch in diameter.

One of the most remarkable varieties is the Summer White Grape or Early White. In appearance, it presents some peculiarities. The leaves are on rather long, bristly and downy footstalks, with a rusty down closely covering the under surface. The fruit is two thirds or three quarters of an inch in diameter, round, pale green, or of the translucent color of the Malaga grape, when just ripe, afterwards turning red. It is, in some varieties, very agreeable to the taste. It ripens in the last of July, and in August and September. I have gathered some of this variety in the woods, decidedly superior to the Isabella grape.

Another very common variety is the Early, or Summer Fox, Grape. Of this the fruit is about seven eighths of an inch in diameter, of a very deep glossy purple, almost black, with a bluish bloom, pleasant to the taste, ripe in the end of August or in September.

A more common variety is the late Fox Grape. This has a dark purple, almost black, berry, quite large, sometimes nearly an inch in diameter, but of an austere, disagreeable taste.

There are many other varieties. From the seeds of grapes of this kind have been produced the Isabella, the Catawba, Bland's Grape, the Schuylkill, the Elsinburgh, and others. It promises much from the effects of cultivation.

Sp. 2. THE SUMMER GRAPE. *V. æstivâlis*. Michaux.

Figured in Audubon's Birds, with the Pileated Woodpecker, II., Plates 111 and 114.

This vine has much the habit of the last, but may be commonly distinguished by the absence of down upon the branches and leaf-stalks, and by the nakedness of the lower part of the very long trunk, in consequence of the dying of the lower branches.

The recent shoots are smooth, or with very little down, hardly dotted. The leaves are four to seven inches long, and somewhat less in width, very deeply heart-shaped, more inclined to three- than five-angled, often deeply lobed; when young, they are of a reddish or purplish tinge, shining, above, with tufts or cobwebs of brown down, beneath; when old they are glaucous beneath, and downy only on the nerves and veins, — which are often purple near the radiating point.

Tendrils long, smooth, once or twice divided. Racemes very long, compound, the lower branch often becoming a tendril. Berries half an inch in diameter, dark blue, of an agreeable taste, — ripe in October.

Of this grape there are several varieties, one of which is so marked that Pursh suspected it of being a separate species. It is conspicuous for its very deep, palmate lobes, separated by rhomboidal sinuses. I have not been able to examine the fruit and flowers. It is the Frost Grape, or Winter Grape, *V. sinu-âta* of Pursh, a vine with five-lobed leaves, the lobes arranged almost in a circle, the lower ones meeting or nearly meeting at

base. Sinuses of the shape of the hull of a ship, nearly closed in by the lobes, and rounded or acute at base. Surface nearly smooth above, whitish or glaucous, with little tufts of ferruginous down thickly scattered, together with hairs, on the nerves and veins beneath; margin serrate with large obtuse serratures. Fruit in clusters, long and simple, or with two to five branches, small, half an inch in diameter, ripened by the first hard frosts, thence called Frost Grape, but always acerb. Fruit-stalk smooth, purplish; fruit purple. Trunk deep purple, bark separating in long slender stripes. This agrees in many respects with the Summer Grape, but differs in the form of the leaves, and particularly in the time of maturing the fruit, and in its taste. I am therefore inclined to think Pursh's conjecture, that this is a distinct species, correct.

Sp. 3. THE WINTER GRAPE. CHICKEN GRAPE. *V. cordifolia*. Michaux.

This vine is a less vigorous climber than either of the preceding, and has a more delicate appearance. It delights to climb over rocks, along which it extends twenty or thirty feet. It is distinguished for its very short joints and the green color of both surfaces of its leaves. The recent shoots are purplish green, smooth or slightly hairy. Leaves on short petioles, which have a few short hairs; somewhat three- or five-lobed, heart-shaped at base, acuminate, with large, sharp, deeply cut teeth; ciliate on the margin, green on both surfaces, hairy on the nerves, and with cottony tufts at the angles beneath.

Fruit in short clusters, with six to eight, short, crowded branches, dark purple, almost black, when ripe, with a dark blue bloom, about the size of a large pea. Seeds about two; no core; skin very thin; pulp deep purple, almost black. The fruit is very acid, but pleasant, with a rich, spicy taste, and without any acerbity remaining after eating it. It ripens late, and is not affected by the frost.



Illustrated by J. C. Smith, 1880, and J. C. Brown

VIRGINIAN CREEPER. (*Ampelopsis quinquefolia*.)

Of the juice of this grape, Mr. Andrew Mallory, of Russell, has made half a barrel of wine at a time. It is described as of excellent quality, having a strong resemblance to port. The plant is a free bearer and seems to promise much as a wine producer.

Sp. 4. THE RIVER GRAPE. SWEET-SCENTED GRAPE.
V. riparia. Michaux.

I have found this vine on the Westfield River and on some other tributaries of the Connecticut, and in Worcester County, but not in the eastern parts of the State; and I have found only the barren flowers. It has the same appearance as the preceding, differing in the greater pubescence on the stalks, veins, and margins of the leaves; and Dr. Gray considers it a variety.

The flowers of all the wild grapes have a pleasant fragrance, not unlike that of mignonette: of this species or variety the flowers are still more fragrant.

XXX. 2. THE CREEPER. *AMPELOPSIS*. Michaux.

A genus of a few species, which are found in Africa, in Java, but mostly in the United States. Calyx entire, or slightly five-toothed. Petals five, distinct, spreading, reflected. Ovary conical, not immersed in the disk, two-celled, with two ovules in each cell; style short. Berry two-celled; the cells one- or two-seeded.

THE VIRGINIAN CREEPER. *A. quinquefolia*. Michaux.

Figured in Abbott's Insects of Georgia, I., Plate 30; and in our Plate.

This is the most ornamental plant of its genus, and has been extensively cultivated in this country and in Europe. It recommends itself by its hardiness, the rapidity of its growth, and the luxuriance and beauty of its foliage. In its native

woods it climbs rocks and trees to a great height. In cultivation, it is often made to cover walls of houses forty or fifty feet high, — clinging by rootlets which proceed from its tendrils. Its recent shoots are green or purplish brown, with long orange dots. The older stalks are covered with a sort of net-work of cuticle, the meshes of a uniform size, except that they enlarge at the axils of the branches. Leaves on very long, channelled, purple or crimson leaf-stalks; of five leaflets palmately arranged. Leaflets irregular, obovate, wedge-shaped below, acuminate, with a few mucronate teeth above and sometimes a little below the middle, smooth, nearly of the same deep green on both surfaces, turning purple, deep red, or crimson early in autumn. Tendrils opposite the leaves or branches. As in the vine, the stem seems to be formed by the successive development of axillary buds. Stem often strangulated or nearly cut off by a tendril. This plant continues to flower and attract the humblebee and the honey-bee through July and August. The flowers are of a reddish green. The calyx is an even or slightly waved border, encircling the base. The petals, which are perhaps true sepals, are completely reflexed and slipper-shaped, reddish, with a yellowish green border. Stamens five, erect, opposite the petals, inserted at the base of the ovary, which is reddish and conical, surmounted by a roundish stigma without a style. Fruit in terminal or axillary panicles, or opposite the leaves. The stalks successively dividing by threes, at equal angles. The berries become dark blue or nearly black, when mature; at the same period, the fruit-stalks and tendrils assume a rich crimson or red color.

The great variety of rich colors — shades of scarlet, crimson, and purple, — which the leaves and stems of this plant assume, and the situations in which we see it, — climbing up the trunks and spreading along the branches of trees, covering walls and heaps of stones, forming natural festoons from tree to tree, or trained on the sides and along the piazzas of dwelling houses, —

make it one of the most conspicuous ornaments of the autumnal months. Often, in October, it may be seen mingling its scarlet and orange leaves, thirty or forty feet from the ground, with the green leaves of the still unchanged tree on which it has climbed.

FAMILY XXXI. THE BUCKTHORN FAMILY. *RHAMNACEÆ*.
JUSSIEU.

Found everywhere except in the polar regions, but chiefly in the hotter parts of the United States, Europe, and Asia, and the northern parts of Africa.

The inner bark and fruit of the Buckthorns, as well as of most plants in this family, have active cathartic powers, and some of them are also emetic and astringent. The young shoots and leaves of one species, *Rhamnus alaternus*, dye wool of a yellow color. The bark and berries of another, *R. tinctorius*, are valued as dyes. The Avignon berry, the fruit of *R. infectorius*, is used to give its yellow color to Morocco leather. A similar dye is obtained from several other species, natives of the shores of the Mediterranean. With preparations of iron, some of them give a good black. The aromatic leaves of a species of Sagerètia, *S. theæzans*, are used by the poor in China as a substitute for tea. The lotus of the ancients, eating which, — as was fabled by Homer, — men forgot home and friends, — was the fruit of *Zizyphus lotus*, and gave a name, Lote-eaters, to the nation that subsisted on it. The delicate jujube paste is prepared from the fruit of another species of the same plant, common in the markets of Constantinople. *Christ's Thorn*, a plant common in sterile places in Palestine, has its name from a tradition that it furnished the crown of thorns for the brow of the Saviour.

There are two genera in Massachusetts: —

1. *Rhamnus*, with flowers in small, axillary bunches; and
2. *Ceanothus*, with flowers in large, showy, terminal bunches.

XXXI. 1. THE BUCKTHORN. *RHAMNUS*. L.

This is a genus of thirty or more species of shrubs or small trees with alternate or rarely opposite leaves, on short peti-

oles; and minute flowers, usually growing in short, axillary clusters. The calyx is four- or five-cleft, with its tube lined with a thin disk; the petals four or five, emarginate or two-lobed; ovary two- to four-celled, not immersed in the disk; styles two to four. The fruit is drupe-like, and contains two to four cartilaginous nuts.

Sp. 1. THE COMMON BUCKTHORN. *R. Catharticus*. L.

Figured in Loudon, Encyclopædia, 173, Figure 209.

The buckthorn is often found growing wild in the neighborhood of Boston, and rarely in other parts of Massachusetts; but it was probably introduced from Europe, where it is a native. It is an upright, branching bush or low tree, growing to the height of ten or fifteen feet, with a smooth stem of reddish brown or grayish olive, and grayish branches; the lower ones short and stiff, nearly horizontal, and ending in a rigid, sharp point. They thus act as thorns, though leafy. The leaves are nearly opposite, broad-oval or ovate, irregularly toothed or notched or waving on the border, of a soft texture, smooth above, somewhat hairy on the prominent veins beneath.

The flowers have three or four stamens. The berries turn to a shining black in autumn. They are found in clusters, on short stalks coming from the axils of the lower leaves, or beneath them. They are large and globose, and contain four prismatic, cartilaginous seeds or nuts.

The fruit of the buckthorn was formerly employed in medicine as a purgative; but is too violent and drastic to be safely used, and is now chiefly confined to veterinary practice, to which it is well adapted. The saffron-colored juice of the unripe berries, called *French berries* by dyers, is used as a paint and a dye. *Sap-green* is made of the inspissated juice of the ripe berries, with alum and gum Arabic. If gathered very late, they yield a purple instead of a green color. The bark furnishes a beautiful yellow dye; or, dried, it colors

brown. The wood of the roots is yellowish-brown, with a satiny lustre, and very compact, and may be employed by the turner. Sheep and goats are fond of the leaves, but cattle refuse them.

The buckthorn is well suited to form hedges, either by itself or still better in conjunction with the thorn. It bears pruning, grows rapidly, is tough, and not liable to the attacks of insects, and is hardy, and not difficult as to soil. It puts forth its leaves early in the spring and retains them late in the fall; and its bunches of rich black berries are very showy in the autumn. It may be propagated by seed, which comes up the first season, or by suckers or layers.

The seed should be sown in the fall, when fresh from the tree. It vegetates early next spring. The plants may remain in the seed-bed a year, and then be transferred to the nursery until they are eighteen inches or two feet high, when they may be planted in a single or double row, eight or nine inches apart, for a hedge. As soon as they begin to vegetate, they should be headed down to within six inches of the ground. This causes them to thicken at the bottom, — an important point, whether utility or beauty is considered.

Sp. 2. THE ALDER-LEAVED BUCKTHORN. *R. alnifolius*.
L'Heritier.

Figured in Loudon, Encyclopædia, 175, Figure 258.

A stout, very leafy bush, three or four feet high, growing in clumps, in moist lands, with a dark-colored stem and grayish branches. The leaves are broad-oval, two or three inches long, acute or rounded at base, obtusely serrate, acuminate, smooth on both surfaces, with a slight down on the midrib and veins above, the veins very prominent beneath. The flowers are on short stems in the axils of the lower leaves of the recent shoots. The tube of the calyx is cup-shaped, with the segments spreading. The fruit is black, fleshy, somewhat pear-shaped, with three seeds. Flowers in May and June.

XXXI. 2. NEW JERSEY TEA. *CEANOETHUS*. L.

Shrubs, or somewhat shrubby plants, not thorny. Roots large, reddish, astringent. Leaves alternate, commonly ovate or elliptical, serrate or entire. Flowers white, blue, or yellowish, in umbel-like fascicles, which are aggregated at the extremity of the branches. Calyx bell-shaped, five-cleft; the upper portion at length separating by a transverse line; the tube adhering to the base of the ovary. Petals five, longer than the calyx, saccate and arched, on long claws. Stamens projecting. Disk fleshy at the margin, surrounding the ovary. Styles three, sometimes two, united to the middle, diverging above. Fruit dry and coriaceous, mostly three-celled, obtusely triangular, girt below by the persistent tube of the calyx, three-seeded, the cells at length opening. Seeds obovate.

NEW JERSEY TEA. *C. Americanus*. L.

A low, bushy shrub, one to three feet high, flowering in June and July, growing on dry, sunny slopes. The stem is of a polished olive green below, striated with brown. Recent shoots of a lively green, turning brown on drying, smooth, or sometimes downy. The leaves are two to two and a half inches long, and one to one and a half wide, conspicuously three-ribbed, on short footstalks, oblong-ovate, tapering gradually to a point, serrate, with the serratures ending in a brown, glandular point, smooth above, paler and somewhat downy beneath, the down on the footstalk and veins often rust-colored.

The minute white flowers are in crowded clusters, on the sides, short branches, and ends of long downy footstalks, which proceed from the axils of the upper leaves, and have one or two small leaves on them. Each flower stands on a white, thread-like stalk. The calyx ends in five rounded segments,

bent inwards. The petals are oblique, covered cups, on a thread-like claw, alternating with the segments of the calyx.

The fruit is a dry, three-sided berry, with very obtuse angles, lying in the enlarged lower portion of the calyx, and opening from the centre. Seeds three, inversely egg-shaped, shining and smooth, slightly flattened on one side.

The leaves have been used, particularly during the American Revolution, as a substitute for tea. The bark of the roots, which is of a deep red color, has astringent qualities, and has been successfully used, in infusion, tincture, or powder, to produce the effect of astringent medicines. In Canada, it is used to dye wool of a Nankin or cinnamon color.

FAMILY XXXII. THE STAFF-TREE FAMILY. *CELASTRACEÆ*. R. BROWN.

This is a small family, comprising low trees or shrubs, sometimes climbers, with alternate or opposite leaves, and flowers which are usually perfect, but sometimes sterile and fertile on different plants, arranged in racemes or cymes. They are natives of the warmer parts of both continents, chiefly without the tropics, abounding especially at the Cape of Good Hope. Several species of the Spindle Tree, *Eubonymus*, are valued in ornamental gardening, as are the Bladder-nut and Wax-work of our own woods. The properties of the family are not well known. The fruits and seeds of some species produce purgative and emetic effects; and others are used for dyeing red, yellow, and green. They are distinguished by having four or five, usually persistent, sepals, united at base; four or five petals, alternate with the sepals, and inserted by a broad base under the edge of a fleshy disk which covers the bottom of the calyx; four or five stamens, alternate with the petals, inserted on the edge of the disk; a free ovary, immersed in the disk, with one to five one- or many-ovuled cells, and as many cohering styles and stigmas. The fruit is one- to five-celled, membranous, drupaceous, capsular, or fleshy, with ascending seeds.

Two genera are found in Massachusetts: —

1. *Staphylèa*, with ternate leaves; and
2. *Celástrus*, with alternate, simple leaves.

XXXII. 1. THE BLADDER-NUT. *STAPHYLEA*. L.

A genus of a few species of American and European shrubs. Flowers perfect. Sepals five, oblong, erect, colored, persistent. Petals five. Stamens five, alternate with the petals. Ovary of three carpels, united at the axis. Styles separate or separa-

ble. Fruit a membranaceous and inflated, two- to three-celled, two- to three-lobed capsule. Seeds globose, ascending, few, or, by abortion, solitary in each cell; albumen little or none. Leaves three- to seven-foliolate. Flowers white; the racemes sometimes panicked.

THREE-LEAVED BLADDER-NUT. *S. trifolia*. L.

Figured in London, Encyclopædia, 147, Figures 197, 198.

An irregular, handsome, tall shrub or small tree, with spreading branches, growing on the borders of damp woods. It rises to the height of eight to fifteen feet, and is of rapid growth; the shoots and offsets often making five feet or more in a season. The shoots are of a light green, thickly dotted towards the base with white dots, which enlarge in the succeeding years, and give the purplish brown branch a beautifully striated appearance. The trunk is of a light gray color, with linear, white cracks. The leaves are opposite, on long, channelled or angulate footstalks, somewhat hairy towards the end; leaflets three, broad-oval or ovate, rather acute at base, acuminate, finely serrate, light green and smooth above, lighter and somewhat hairy beneath. The flowers are in terminal or axillary, pendulous racemes, with opposite fascicles of flowers, and linear bracts at the base of the partial footstalks. Calyx a circle of five oblong sepals, often tinged with pale rose color, embracing a circle of five obovate, reflected petals, alternate with the sepals, contracted towards the base, and folding so as to form an imperfect tube, ciliate below. Five slender, thread-like filaments, opposite the sepals, with yellow anthers, show themselves above the corolla, and open lengthwise towards the stigma, which is simple, and supported by three cohering styles as long as the stamens. Fruit an inch and a half or two inches long, made up of three membranous capsules or pods, grown together, each ending in an awl-like point, which is the style. The pods are not unlike pea-pods in texture, and strongly resemble them in smell. The seeds are usually abor-



WAX MYRTLE (*Myrica cerifera*)

tive, except, in one of the pods, a single one, which is brown, ovoid, and flattened at one end.

The seeds of the European species, which is very analogous to ours, differing from it in having five to seven leaflets, are strung as beads by Roman Catholics, in some countries. The wood is yellowish-white and close-grained.

XXXII. 2. THE STAFF TREE. *CELASTRUS*. L.

A genus of nearly seventy species of unarmed, climbing shrubs, found in America, Asia, and tropical Africa. Flowers small, pale yellowish-green, in axillary or terminal, bracteated racemes. Leaves alternate, of thin texture, with very minute stipules.

Fertile and sterile flowers sometimes on separate plants. Calyx five-lobed, forming a short tube. Petals five. Stamens five. Ovary three-celled, sessile on the fleshy disk. Styles short, united, with a three-lobed stigma. Capsule imperfectly two- or three-celled. Seeds one or two in each cell, enclosed in a pulpy aril. Embryo in the thin albumen, nearly as long as the seeds. Cotyledons broad and leaf-like.

THE CLIMBING STAFF TREE. WAX-WORK. *C. scandens*. L.

See our Plate.

This is a beautiful, twining shrub, climbing over rocks, bushes, and trees, often to the height of fifteen or twenty feet, and delighting in moist and shady situations. The stem is very slender, rarely more than an inch thick, preserving its size but enlarging at the angle of the branches and just below. It is of an olive green, or alder color, ash or clay-colored above, conspicuously dotted with numerous, oval, brown dots, and terminating in long and slender green shoots, with small leaves.

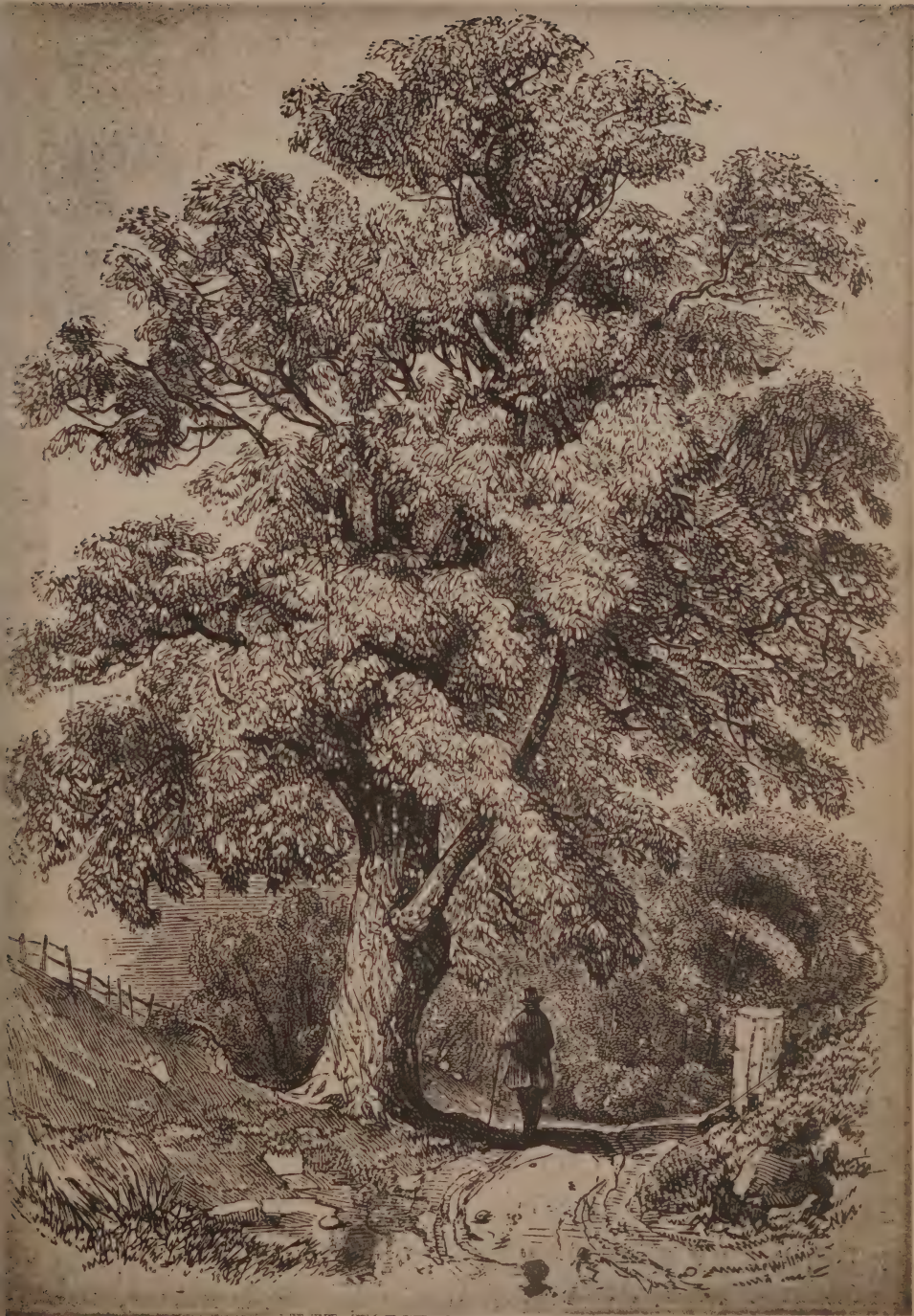
The leaves vary from egg-shaped to elliptic and inversely egg-shaped, acute or somewhat decurrent or rounded at base, with

a short, rather abrupt acumination, deeply serrate, often reflexed at the margin, green above, lighter below. They are from two to five inches long, and one third less in breadth. Petiole rather short, margined above. The calyx is somewhat bell-shaped, with five yellowish-green segments; the corolla five greenish-yellow petals, expanding, somewhat fringed on the edge. The flowers are in terminal panicles, with small leaves at the base of the lower branches. The fruit is of an irregular globular shape, supported by the five rounded, thin segments of the persistent calyx, and surmounted by a short, capitate stigma, and containing an orange-colored pulp, and two to six seeds surrounded by a pulpy aril. When mature, the three orange-colored valves open and disclose this as a scarlet berry. The leaves turn early to a yellow. Climbing upon a chestnut, early in autumn, its orange-scarlet clusters of shining berries, and its yellow leaves, contrast finely with the bright deep green trunk and leaves of the tree.

It forms a beautiful covering for walls or trellis work, and should be cultivated for its picturesque effect. It may be propagated by seeds or by layers.

THE HORSE-CHESTNUT.

To this place belongs the HORSE-CHESTNUT TREE FAMILY, *Hippocastanaceæ*, D. C., of which a detailed account is not given here, as no plants belonging to it are indigenous to Massachusetts. It is a small family, consisting of one species, the cultivated Horse-Chestnut, which is a native of northern and central India, and five or six others (twenty, according to Spach, Hist. Nat., Vol. III., 16), which are natives of the temperate regions of this country. They are magnificent trees or beautiful shrubs, distinguished for their showy, pyramidal flowers and chestnut-like fruit; and extremely easy of cultivation. The cultivated tree, *Aesculus hippocastanum*, was introduced into the gardens of France in 1615 from Constantinople.



HORSE CHESTNUT. *Aesculus hippocastanum*.

It is sometimes a tree of eighty feet in height and three or four in diameter. The wood is of little value; the bark abounds in tannin, has astringent and febrifugal properties, and may be used to dye yellow; and the fruit is saponaceous, and is eaten by sheep and deer, and, when boiled, is used to fatten cattle and fowls. In Turkey and Germany, it is employed in veterinary medicine, whence the name *horse-chestnut*, and the specific name *hippocàstanum* given it by Tournefort. Of the American species, one, the Ohio Buckeye, *Æ. glàbra*, resembles the cultivated in its prickly fruit. It is a small tree, with a rough bark which exhales a disagreeable odor. Of the others, which are distinguished by the smoothness of their fruits, the Sweet Buckeye of the Western and Southern States, *Æ. flàva*, with yellow flowers, is found from four to eighty feet high, and with a trunk sometimes four feet in diameter. The others, *Æ. parviflòra*, *Califòrnica*, *pàvia*, and their varieties, are shrubs or small trees.

FAMILY XXXIII. THE MAPLE FAMILY. *ACERACEÆ*.

JUSSIEU.

This family, which contains two or three genera besides the maple, consists of trees or tall shrubs, with opposite leaves without stipules. The flowers, springing from the axils of the leaves or buds, are either perfect, or contain pistils or stamens only. On the tall trees, they are usually in corymbs; on the smaller plants, as on the Moose wood, they hang in a beautiful raceme, like a bunch of currants.

Early in the season, from a bud in which they overlie each other like tiles, usually five, sometimes four to nine, sepals expand, within which and alternate to them are the same number of petals, and usually eight distinct stamens. In the centre is a two-lobed ovary, with one style and two stigmas. The fruit, called a samara, consists of two parts, united, with broad, nerved wings, each part containing one cell and one or two seeds. These are erect, without albumen, containing a curved embryo, with wrinkled, leaf-like cotyledons, and an inferior radicle.

In no part of the world are the maples of greater importance than in New England. The excellence of the wood as fuel, the various uses in the arts to which, from its softness in some species, its hardness in others, and its great beauty in all, it may be put, the resource it furnishes in the sugar extracted from its sap, and the value of several of the species as ornamental trees, give it a place hardly second to any of the trees which cast their leaves, at least for the northern part of the country.

THE MAPLE. *ACER*. L.

The genus *Acer* is distinguished by having its flowers polygamous, that is, male, female, and perfect flowers on the same or different individuals; petals colored like the sepals, but



SYCAMORE. *Acer Pseudo-platanus*.



often wanting; stamens seven to ten, rarely five; and simple leaves.

Nearly forty species of maple are known, of which ten belong to the United States. No climate is better suited to their growth than that of New England, as is shown by the perfection to which several of the most valuable species attain here. There are several other species deserving to be introduced for their economical value and their beauty. Among these, the most conspicuous perhaps is the Large-leaved Maple, *A. macrophyllum*, of Pursh, introduced into England by Mr. Douglas from the northwest coast of North America, and described by him as a tree of the largest size, sometimes ninety feet high and sixteen in circumference, and yielding a wood soft but beautifully veined. It would doubtless flourish on this side of the continent, as would the Round-leaved Maple, *A. circinatum*, of the Columbia River. Others are the Sycamore or Great Maple of Europe, *A. pseudo-platanus*, and the Norway Maple, *A. platanoides*, both of which grow as readily here as our own trees, and the former of which, remarkable for its rapid growth, sometimes attains to a height of one hundred feet. The Field Maple, *A. campéstre*, the common maple of the continent of Europe, the Montpelier Maple, which abounds in the south of France and in Italy and Spain; the Guelder-rose-leaved Maple, *A. opulifolium*, of the mountains of southern France, the Italian Maple, *A. ópalus*, of Corsica; the Tartarian Maple, of Russia, and the Smooth-leaved Maple of Nepaul, *A. levigatum*, are all trees which attain more than a medium size, are sufficiently hardy to flourish here, and have strong claims as ornamental trees to invite the attempt to cultivate them.

Dr. Harris describes two kinds of insects whose attacks are very pernicious to the maples. The first is the beautiful *Clytus* (Report, p. 101, figured in Plate II.), a beetle about an inch in length, of a black ground color, ornamented with bands and spots of yellow. It lays its eggs on the trunk of the Sugar

Maple in July and August. The grubs burrow in the bark as soon as hatched, and are there protected during the winter. "In the spring, they penetrate deeper, and form, in the course of the summer, long and winding galleries in the wood, up and down the trunk. In order to check their devastations, they should be sought for in the spring, when they will readily be detected by the saw-dust that they cast out of their burrows; and, by a judicious use of a knife and stiff wire, they may be cut out or destroyed before they have gone deeply into the wood."

The other, less injurious, is the caterpillar of the *Apatèla Americana* (Report, p. 436), one of the owlet moths. It feeds on the leaves of the several kinds of maple, as well as on those of the elm and chestnut.

The maples may be propagated by seeds; and, in some instances, by layers, by cuttings of the roots, and by grafting. Most of those of our own country have been successfully engrafted upon the sycamore of Europe. The seeds of most species ripen early; those of the Red Maple and the White, early in summer; of the others, not later than October. They may be gathered when the keys begin to turn brown; and sown in autumn, soon after gathering, or in the succeeding spring. The latter is preferable where moles or mice abound. The seeds should be covered with not more than a quarter or half an inch of soil; but the surface should be protected by leaves, straw, or some other light substance. They will come up in five or six weeks. For keeping through the winter, the seeds should be mixed with sand or earth, and kept moderately dry. If kept perfectly dry and without earth, they are apt to lose their power of vegetation. The young plants are ready to be transplanted at a year's growth, and do better if moved then than afterwards. Whenever transplanted, they should not have their heads or branches lopped, as they recover very slowly from such wounds.

Within Massachusetts there are found five species of Maple,



Sprague, del

Armstrong & Co. lith. 166 Congress

RED MAPLE. (*Acer rubrum*.)

three of them timber trees: 1, the Red Maple; 2, the White or River Maple, the flowers of both of which appear before the leaves; 3, the Rock Maple or Sugar Maple, whose flowers appear with the leaves; and two tall shrubs or small trees, — 4, the Striped Maple, with flowers in pendulous, and, 5, the Mountain Maple, with flowers in upright, racemes, appearing after the evolution of the leaves.

Sp. 1. THE RED MAPLE. *Acer rubrum*. L.

Figured, the leaves, in Abbott's Insects, II., Plate 93: in Audubon's Birds, fruit, Vol. I., Plate 54; flowers, I., 67: and in our Plate.

The Red Maple, called also the White, the Swamp, the Scarlet, and the Soft Maple, is a tree of middling size, growing abundantly in swamps and low grounds, in most parts of the State. Its flowers, which appear in April or May, before the leaves, are of a bright crimson or scarlet, and make a striking appearance in whorls or pairs of sessile, crowded bunches, on the scarlet or purple branches. The flowers are of two or three kinds, found on different trees. They issue from opposite, somewhat quadrangular, scale-buds, each bud consisting of several scales, of which the inner ones are more delicate, and containing about five flowers. The barren flowers are made of a cup of eight to ten or twelve divisions: the outer ones, the sepals broader; the alternate, inner ones, the petals, narrower, more delicate, and often bending inwards. The stamens are four, five, or six, twice as long as the sepals, to which they are opposite, and proceeding, with them, from the outer edge of a fleshy, glandular disk. In the perfect, fertile flowers, the calyx and corolla rise from one cup: the sepals broader, external; the petals narrower, alternate, internal, sometimes fringed. The stamens five, opposite the sepals, short, proceeding from the outer edge of a fleshy disk. The styles are two, long, diverging, curved, the upper edge a downy stigma. The germs are two, changing into the united samaræ or keys, with wings resembling those of an insect.

The recent shoots are of a reddish or crimson color, dotted with brown, and changing gradually into the beautifully clear ashy gray of the trunk. In old trees, the bark cracks, and may be easily peeled off, in long, slender flakes. The gray, uniform color of the bark is often varied with patches of white lichens, and not uncommonly covered entirely with those of various shades of gray or white, finely dotted with their black or brown fructification. The leaves, which are plaited in the bud, where they are protected by four pairs of leaf-buds, are on long, round petioles, which are usually reddish, and toward autumn of a bright scarlet. They are commonly of three or five lobes, the notches between the lobes always sharp. They are usually heart-shaped, but sometimes straight or rounded at base. They vary exceedingly in size and shape, being sometimes very broad, with five palmately divergent lobes, sometimes long and narrow, the lower lobes reduced to mere serratures, and the middle ones prolonged and nearly parallel to the terminal one; the margin slightly and irregularly toothed, or deeply cut into long, slender serratures. The surface is liable to be variegated with lines of scarlet, or to become entirely scarlet, or crimson, or orange, at every season of the year. This occasionally happens to all the leaves on a tree, even in the middle of summer, forming a gorgeous contrast with the green of the rest of the forest. The differences in the leaves are accompanied by corresponding differences in the branches and general appearance of the tree; and the common, well-founded opinion is that there are several distinct varieties of this tree. The leaves begin to change their color in August, and are usually gone by the first of November.

The observation, for a single year, of the varying colors of the Red Maple would be sufficient to disprove the common theory that the colors of the leaves in autumn are dependent on the frosts. It is not an uncommon thing to see a single tree in a forest of maples turning to a crimson or scarlet, in July or August, while all the other trees remain green. A

single brilliantly-colored branch shows itself on a verdant tree, or a few scattered leaves exhibit the tints of October, while all the rest of the tree and wood have the soft greens of June. The sting of an insect, the gnawing of a worm at the pith, or the presence of minute, parasitic plants, often gives the premature colors of the autumn to one or a few leaves. The frost has very little to do with the autumn colors. Some trees are not perceptibly affected by it. The sober browns and dark reds, those of the elms and several of the oaks, may be the gradual effects of continued cold. The brighter colors seem to depend upon other causes. An unusually moist summer, which keeps the cuticle of the forest leaves thin, delicate, and translucent, is followed by an autumn of resplendent colors. A dry summer, by rendering the cuticle hard and thick, makes it opaque, and although the same bright colors may be formed within the substance of the leaf, they are not strongly exhibited to the eye; the fall woods are tame; and the expectation of the rich variety of gaudy colors is disappointed.

The question why our forests are so much more brilliant, in their autumnal livery than those of corresponding climates and natural families in Europe, cannot, perhaps, be fully answered. It depends, there can be little doubt, on the greater transparency of our atmosphere, and the consequently greater intensity of the light; on the same cause which renders a much larger number of stars visible by night, and which clothes our flowering plants with more numerous flowers, and those of deeper and richer tints; giving somewhat of tropical splendor to our really colder parallels of latitude. The Norway maple of England, *Acer platanoides*, planted in this State, assumes, from year to year, more of the colors of our maples.

On the first evolution of the leaves in spring, and, afterwards, when they expand during a series of cloudy days, their color is a delicate yellowish-green, which is supposed to be

owing to the green coloring matter within the cells of the leaves, the *chromule*, or *chlorophylle*, seen through their white or yellowish membranous coverings. A few hours of sunshine give a visibly deeper tint to the green, which becomes still more intense in the clear and bright sunshine of June and July. This formation of green is found to be connected with the decomposition of the carbonic acid gas which is taken up in the sap, and the consequent evolution of oxygen, and the deposition of carbon in the vessels of the plant. The color of the *chromule* is therefore thought to depend upon its greater or less oxygenation, — a free acid, that is, an excess of oxygenation, being sometimes found in the *chromule* when it has become yellow or red. Minute portions of iron, carried up by the sap, and deposited in the vessels of the leaves, may possibly contribute to the depth of the colors, although some of the best physiologists doubt in regard to this. Whatever may be the cause, the effect is infinite beauty; and Bryant must have been thinking of the maples when he said, —

“ And when the autumn comes, the kings of earth
In all their majesty are not arrayed
As ye are; clothing the broad mountain-side,
And spotting the smooth vales, with red and gold.”

The Red Maple is usually a low, round-headed tree, of less beauty of shape than either of the other species. But the great variety of rich hues which it assumes, earlier in the fall than any other tree, gives it a conspicuous place in our many-colored autumnal landscape. Sometimes, when growing in rich, wet land, it attains to a great height and size, rising to seventy or eighty feet, with a trunk three or four feet in diameter. It has then a very rough bark.

The wood is whitish, with a tint of rose color, of a fine and close grain, compact, firm and smooth, the silver-grain lying in layers very narrow and close, and the pores being very small. It is well suited for turning, and takes a fine polish; is easily wrought, and serves for a great variety of purposes. It is

much used for common bedsteads, tables, chairs, bureaus, and other cheap furniture. In building, it serves well for joists, is an excellent material for flooring, and may be used for any part not exposed to dampness. It lasts well in the flat of a ship's floor. It has sufficient elasticity to serve to be made into oars, which are almost equal to those of white ash. Its defects are want of strength, and its speedy decay when alternately exposed to moisture and dryness.

There are several varieties of the wood, such as the Curled Maple, the Landscape, the Mountain, the Blistered, &c. Curled Maple is the name given to a variety whose longitudinal fibres have a serpentine course, presenting, when sawn lengthwise, a varying succession of light and shade, which has a beautiful effect in cabinet work, imitating the lustre of changeable silk. It is comparatively tough and compact, while it is very light, and is used for gun-stocks and the ornamented handles of utensils. Landscape and Mountain Maple are varieties in color, caused by the irregular change from sap-wood to heart-wood. These are much used for the foot and head-boards of bedsteads, and for panels of doors to wardrobes, &c. Blistered Maple is a rare variety, resembling the Bird's Eye of the Rock Maple. As fuel, the Red Maple is much used, burning readily and rapidly when dry; and, for this purpose, it is five eighths as valuable as rock maple, and about half as valuable as hickory.

Bancroft says that the bark, when used with an aluminous basis, produces a lasting cinnamon color on wool and on cotton; and, with sulphate or acetate of iron, communicates to them a more intense, pure, and perfect black than even galls, or any other vegetable substance known to him; and that the leaves produce effects nearly similar to the bark.¹ Darlington says that the bark affords a dark, purplish blue dye, and makes a pretty good bluish-black ink. For both these purposes, its use is well known in this State. The sap may, like that of the

¹ Philosophy of Permanent Colors, II., 272.

other maples, be boiled down to sugar, but it is only half as rich in saccharine matter as that of the Sugar Maple.

The Red Maple is of rapid growth, young trees increasing in diameter from two fifths to two thirds of an inch in a year, — older ones somewhat less ; — the average may be not far from one quarter of an inch. Though it may be made to grow in any land not too dry, it flourishes and attains its largest size only in rich swampy land.

It is found in Canada, and thence southward to Florida, and westward to the sources of the Oregon.

Sp. 2. THE WHITE MAPLE. *Acer dasycarpum*. Ehrenberg.

Figured in Michaux, I., 213, Plate 40 ; and Loudon's Arboretum, V., 39 and 40 ;
and in our Plate.

Along the sandy or gravelly banks of clear, flowing streams, the White Maple is found, all through the middle and western parts of the State. I have not yet found it, growing naturally, nearer to Boston than on the Ipswich River, and on the Sudbury River, in Wayland and Sudbury. On the rich meadows on Connecticut River, and on the Nashua at Lancaster, where alone I have found it growing in favorable circumstances, it expands with an ample spread of limb, forming a broad and magnificent, if not a lofty head. When planted closely, in rows or clumps, it grows very rapidly, and becomes a handsome, tall tree.

From the red maple, with which it is sometimes confounded, it may be easily distinguished by the silvery whiteness of the under surface of the finer, larger leaves, and by the color of the spray: The young shoots are of a light green, inclined to yellow, with oblong, brown dots ; in the second year, they become finely striate with brown, and the dots enlarge. Afterwards, they assume the ash or granite gray of the trunk. The bark continues smooth until the tree has attained a considerable size ; in old trees, the trunk is rough with oblong scales, several inches in length and free at one end or both. The branches are



WHITE MAPLE (*Acer dasycarpum*)

large, gradually expanding as they ascend, but sometimes pendulous, somewhat in the manner of those of the elm.

The flowers come out early in April, before the leaves. The male flowers are in close, abundant, crowded whorls, on long footstalks. The stamens are about six. The female flowers are somewhat less crowded. The stigma is short. The two kinds of flowers are sometimes intermingled. The pedicel of the female flower afterwards lengthens. The mature seed-vessels, or samaræ, cohere at a somewhat large angle; they are thick, and nearly two inches in length; when young, covered with yellowish hairs, but afterwards becoming nearly smooth.

The leaves, on long and slender footstalks, are often five or six inches long and four or five wide, deeply divided, usually into five, sometimes into but three, long lobes, tapering to a long point, each somewhat three-lobed and deeply and sharply cut into slender teeth. The notches between the lobes are formed as if by two circles intersecting each other. The under surface of the leaves is of a silvery whiteness. The last-formed leaves are remarkably and beautifully cut. The young leaves are covered with a brownish pubescence, but at length become entirely smooth.

The wood of the White Maple is soft, white, and fine-grained, but with little strength, and very perishable. It is therefore little used where almost any other wood can be found. Its sap contains sugar, but far less abundantly than the Sugar Maple. The bark may be used, with the salts of iron, to form a black dye.

The beauty of the finely cut foliage, the contrast between the rich green of the upper surface of the leaves and the silver color of the lower, and the magnificent spread of the limbs of the White Maple, recommend it as an ornamental tree; and it has been extensively introduced in New York, Philadelphia, and some other cities.

On the banks of the Nashua, in Lancaster, below the con-

fluence of the two streams, in a meadow pasture on the north side, are found some old River Maples, — one, which had been much injured by the ice, in the freshets of former years, measured, in 1840, twelve feet nine inches in circumference at the surface, nine feet six inches at three feet, and ten feet four inches at six feet, from the ground, — a broad spreading tree.

On the meadows at Northampton, near the road from the town leading to the ferry of Mt. Holyoke, one is found which in 1837 measured twelve and a half feet at three and a half feet from the ground. This is a noble tree.

An old gnarled tree in a pasture meadow north of Centre Bridge, Lancaster, measured, in 1840, eighteen feet five inches at one foot from the ground, the bulging roots preventing my measuring it at the surface. At three feet, it measured sixteen feet eight inches, at six feet, thirteen feet ten and a half inches. It divides at a low point into several large branches, and rises to about sixty feet. An old tree on the Atherton road measured fifteen feet ten inches near the roots, and twelve feet four inches at three feet above.

A vigorous, round-headed tree near Rev. Louis Dwight's barn in Stockbridge, measured, in 1843, twelve feet in girth at three feet from the ground.

Sp. 3. THE ROCK MAPLE SUGAR MAPLE. *A. saccharinum*. L.

The leaves, flowers, and fruit are well figured in Michaux, Sylva, I., Plate 42; a young tree, leaves, spray, and flowers, in Loudon, Arboretum, V., Plate 87; and in our Plate.

The Rock Maple is easily distinguished from the other maples by the roundness of the notch between the lobes of the leaves, which, in those already described, is somewhat acute. This tree, which is also called Hard Maple, from the character of its wood, and Sugar Maple, from the valuable product of its sap, is, in all respects, the most remarkable tree of the family. When young it is a beautiful, neat, and shapely tree, with a rich, full, leafy head, of a great variety of forms, —



ROCK MAPLE. . (*Acer saccharinum*)

enlarging upwards and forming a broad mass above, — or tapering at each extremity and full in the middle, supported by an erect, smooth, agreeably clouded column, with a clean bark, and a cheerful appearance of vigor. In open pastures, on moist hills and mountain-sides, it forms a broad, pyramidal top, the branches coming out horizontally, or with a gradual upward curvature, from a point eight or ten feet from the ground. On the plain, in deep, moist, clayey soils, the top assumes the shape of a massive cylindrical column of great height, often seventy or eighty feet. In the forest, it assumes its most remarkable appearance; sometimes, from some early casualty, it is seen rising with many angles, not erect but zigzag, and with broad, rounded, oblique ridges on its trunk, sixty or seventy feet without branches, and spreading at top into a flat head of many limbs; or, more frequently, going up, from a base three or four, or even six, feet in diameter, with a straight, erect trunk, disfigured, in very old trees, by gnarled protuberances, but diminishing in size very gradually, to a vast height, and there, above the tops of the other trees, throwing out a noble head of contorted and irregular but vigorous branches. The roots are large, diverging just above or at the surface of the ground, and running near it at first, but afterwards penetrating deep. The bark is of a light bluish-gray color, and, on young trees, very smooth; on old trees it is rough, with very long, ascending scales, projecting irregularly at their edges, but firmly attached at the middle or one side.

The leaves, on long, slender petioles, are from three to five inches long, and of still greater breadth. They are strongly heart-shaped, or sometimes straight at base, and palmately divided into five diverging lobes, which are separated by rounded sinuses, and of which the two lower ones are much smaller and shorter than the others; the lobes tapering to a slender point, and the larger veins forming a few, large, prominent teeth. They are bright green and smooth above; pale glaucous, and at first downy, afterwards smooth, beneath. On

different trees they differ strikingly in their color, being sometimes of a dark and sometimes of a light green on their upper surface. In autumn, they become, often before the first touch of the frost, of a splendid orange or gold, sometimes of a bright scarlet or crimson color; each tree commonly retaining, from year to year, the same color or colors, and differing somewhat from every other tree; and the rich colors continue through October, longer than on most other trees.

The flowers are conspicuously beautiful. The four inner scales of the buds expand in two pairs, like opposite petals, from whose centre springs a corymb of from two to four opposite and terminal branches, each from five to ten flowers, with five sepals, as many petals, and eight stamens.

The sterile flowers are yellowish-green, on an undeveloped branch, with a pair of leaves at its base, and proceed from a long, large bud, whose oblong scales are purplish, one inch long, and fringed with hairs. The flowers are pendulous, on thread-like, hairy pedicels, one or two inches long. The calyx is hairy on the edge within; petals are wanting; the stamens are about eight or ten, twice as long as the calyx. In the fertile flowers, the stamens, about eight, are on short filaments, and the anthers are within the calyx. The stigmas are long, the ovary is conical and hairy. The fruit is borne on long, pendulous footstalks, which are either simple or compound, with several pairs of opposite branches. It is larger and fuller than that of the red maple, but not so thick as that of the river maple.

The Rock Maple is found from 48° north, in Canada, to the mountains of Georgia, and from Nova Scotia to Arkansas and the Rocky Mountains. It is most abundant in the New England States and the country immediately north and south of them. It occurs sparingly in the eastern counties of Massachusetts, but abundantly in the middle and western parts, particularly on the moist sides of the mountains, and in the little valleys among them.

For the purposes of art, no native wood possesses more beauty or a greater variety of appearance than that of the Rock Maple. It is hard, close-grained, smooth, and compact, and capable of taking and retaining an exquisite polish. The straight-grained or common variety has a resemblance to satin-wood, but is of a deeper color. The variety called Curled Hard Maple, which is caused by the sinuous course of the fibres, gives a changeable surface of alternate light and shade, exhibiting an agreeable and striking play of colors. But the most remarkable variety is the Bird's Eye Maple. This is so called from a contortion of the fibres at irregular intervals, throwing out a variable point of light and giving an appearance of a roundish projection, rising from within a slight cavity, and having a distant resemblance to the eye of a bird. All the varieties, particularly the last, are used in the manufacture of articles of furniture, wardrobes, chairs, bedsteads, bureaus, portable desks, frames of pictures, the panels of railway cars, &c. The straight-grained variety is much used in the manufacture of buckets and tubs, and is preferred to every other wood for the making of lasts. Of these, 25,000 a year are made, of this material, in one shop in Lynn. The wood of the apple tree serves as a substitute, and that of the red maple, when growing in pastures; but no other wood unites, in an equal degree, the properties of softness in working, toughness, compactness, and perfect smoothness, when exposed to wear.

In naval architecture, the Rock Maple furnishes the best material, next to white oak, for the keel, and by some persons it is preferred for that purpose. A very intelligent ship-builder in Maine writes me, "For keels, the Rock Maple is preferred for its superior compactness and the cohesiveness of its fibres, which lie in zigzag lines, sometimes entwining themselves in such a manner as to render it almost impossible to separate them or split the stick, which is an important consideration in a ship's keel, it being liable often to strike the bottom and rend. The durability of all kinds of wood under

salt water being considered nearly or quite equal, all objection to maple on account of its tendency to decay when not constantly submerged, is obviated."

In the forest, the Rock Maple often attains great height, and produces a great quantity of timber. A tree in Blandford, which was four feet through at base and one hundred and eight feet high, yielded seven cords and a half of wood.

As fuel, the wood of the Rock Maple holds the first place, in all those parts of New England where the hickory is not found. The ashes abound in alkali; and the charcoal made from the wood is the best in the Northern States.

Michaux says that the wood of this tree may be easily distinguished from that of the Red Maple or the River Maple, by pouring a few drops of sulphate of iron upon it. This wood turns greenish; that of the Red Maple or of the River Maple turns to a deep blue.

In Massachusetts, between five hundred and six hundred thousand pounds of sugar are annually made from the juice of the Rock Maple, valued at about eight cents a pound.¹ The sap of all the maples of New England, and also of the birches, the lindens, the hickories, and the walnuts, is watery and sweet, and contains crystallizable sugar; but none so abundantly as that of the Sugar Maple.

The Sugar Maple should not be tapped before it is twenty-five or thirty years old; but the process may be repeated annually as long as the tree lives. Some trees have been tapped for more than forty successive years without apparent injury. Other trees have had their growth retarded by it. This is probably more owing to the wound necessarily inflicted, than to the loss of the sap, as it is found that the quantity and quality of the sap yielded are visibly improved after the first tapplings. The quality varies with the situation of the tree. In the forest, surrounded by other trees, and having comparatively few branches and leaves, a tree yields but one pound of

¹ The price, in 1874, has varied from ten to twenty-two cents.

sugar for five or six gallons of sap ; when growing in the open ground, where it is exposed to the action of the sun through the year, a tree yields a pound from four and sometimes even from three gallons. The average quantity is from twelve to twenty-four gallons each season. In some instances it is much greater. A gentleman¹ of Bernardston informs me that a tree in that town, about six feet in diameter, favorably situated, produced, in one instance, a barrel of sap in twenty-four hours. The quantity depends also on the number of openings made in the tree.

The sap from trees growing in the maple orchards gives an average of one pound of sugar to about four gallons of sap ; varying considerably in different years. One gentleman in Bernardston made three hundred pounds from sixty trees ; another, four hundred pounds from one hundred trees ; a third, five hundred pounds from one hundred and fifty trees. Some trees will give ten pounds ; some, more. Dr. Rush² cites an instance of twenty pounds and one ounce having been produced, within nine days, in 1789, from a single tree, in Montgomery County, New York ; and Michaux quotes the "Greensburgh Gazette" as his authority for saying that thirty-three pounds have been made in one season from a single tree. Mr. Lucius Field, of Leverett, informed Mr. Colman, the agricultural commissioner, that in one season he obtained, from one tree, one hundred and seventy-five gallons of sap, which, if of average strength, would have made forty-three pounds of sugar.

There are different opinions as to the character of the winters most favorable to the production of sugar. Open winters are thought to cause the sap to be sweetest ; and much freezing and thawing, to make it most abundant and of the best quality. Michaux's inquiries led him to think a cold

¹ Henry W. Cushman, Esq., to whom I am indebted for much valuable information upon this subject.

² Dr. Benjamin Rush's Letter to Thomas Jefferson, on "the Sugar Maple Tree," in the third volume of the Transactions of the American Philosophical Society, first series.

and dry winter most favorable. It is probable that the product depends much more on the character of the previous *summer*. A summer of plentiful rain and sunshine, that is, one which furnishes the trees with abundant nutriment, and is, at the same time, favorable to the elaboration of the saccharine matter and its deposition in the vessels of the wood of the tree, ought naturally to prepare a plentiful harvest of sugar for the subsequent spring.

The time at which the sap begins to run freely varies with the season and with the exposure and elevation of the ground. In warm and low situations, it is earlier; in cold and elevated ones, later. It sometimes begins about the middle of February, usually about the second week in March, and continues into April. A clear, bright day, with a westerly wind, succeeding a frosty night, is most favorable to the flow of sap; a thawing night is thought to prevent its flow; and it ceases during a south wind, and at the approach of a storm. There are commonly from ten to fifteen "good sap days" in the sap season, which continues about six weeks. After this, in spring, and also in summer and the earlier part of autumn, sap continues to flow; but it is not rich in saccharine matter.

The sap is obtained by making an incision with a chisel and boring with a small bit, or by boring, with an auger five-eighths of an inch in diameter, holes inclining upwards, to the depth of from two to six inches, according to the size of the tree, and inserting a spout made of elder, or, most commonly, sumach, the removal of the pith of which leaves a tube large enough for the purpose. Several holes are so bored that their spouts shall lead to the same bucket, and high enough to allow the bucket to hang two or three feet from the ground, to prevent leaves and dirt from being blown in. The openings are usually made on the south and east side, where the sap begins to flow earliest, and afterwards on the north side; or, more commonly, on successive sides in successive years. The sap is collected in large wooden tubs, casks, or troughs, and is evaporated by

boiling over a wood fire, in iron cauldrons containing one or two barrels, or in vessels of iron or copper, four to six feet long, by two and a half to three and a half wide, and eight inches to one foot deep. Sap boiled in copper yields a whiter sugar than that boiled in iron, unless great pains are taken to keep the liquor always at the same height while boiling. The utmost neatness is important at every stage of the preparation and process. In a dry, elastic atmosphere, it takes from two to four hours to boil down a barrel of sap; and a hundred weight of sugar is said to take one cord and one fourth of wood. During the process of boiling, the sap or syrup is strained, lime or salætatus is added to neutralize the free acid, and the white of egg, isinglass or milk, to cause foreign substances to rise in scum to the surface. When sufficiently boiled, the syrup is poured into moulds or casks to granulate; and the uncrystallized syrup or molasses is allowed to drain off through suitable openings. By the addition of lime and clarifying substances to the remaining syrup, it may be made to yield a further quantity of sugar, as its complete crystallization is prevented by the presence of acid, alkaline, or other vegetable matters.¹

When carefully made and purified, maple sugar is almost identical in its composition with that from the sugar-cane. From the season and the mode of its preparation, and the char-

¹ A writer in the "Vermont Temperance Herald," printed at Woodstock, says, "The sap should be gathered in a tub with two heads, the upper one being four inches below the top, and perforated with a hole eight inches square, with a strainer, so that all the sap shall be strained as it enters." "Even with the upper surface of the lower head," or bottom, "the tub should be pierced by an inch auger, and to the orifice a leathern tube of the same diameter affixed, long enough to reach over the top, and be fastened while gathering." "The boiling pans should come in contact with the fire only at a part somewhat less than the whole lower surface, so that the sap may not be burnt. To this end, the fire should be kindled under a permanent arch, in the top of which are openings twenty inches square to receive the boiling pans. When the sap is reduced to syrup, it should be allowed to stand ten or twelve hours, that all remaining impurities may subside, and it should be drawn off above the sediment, and placed over the fire to 'sugar off.' Throughout the whole operation, it is better policy *'to keep out dirt than to take it out.'*"

acter of the persons engaged in the operation, it is ordinarily much cleaner than the foreign muscovado sugars, which are prepared usually by persons stupid and unclean, in the midst of insects and of decaying vegetation. It is desirable, therefore, that its product should be increased; especially as it is made at a season of the year not occupied by other rustic employments, and from trees whose presence along the borders of cultivated lands is a shelter, a protection, and an ornament to the fields which they skirt.

In Stockbridge, Deerfield, and many others of our most beautiful western towns, a single or double row of Rock Maples is the appropriate and magnificent ornament of some of the principal streets and roads. They elevate the public taste; they may be easily made also to contribute to sustain the public burden.

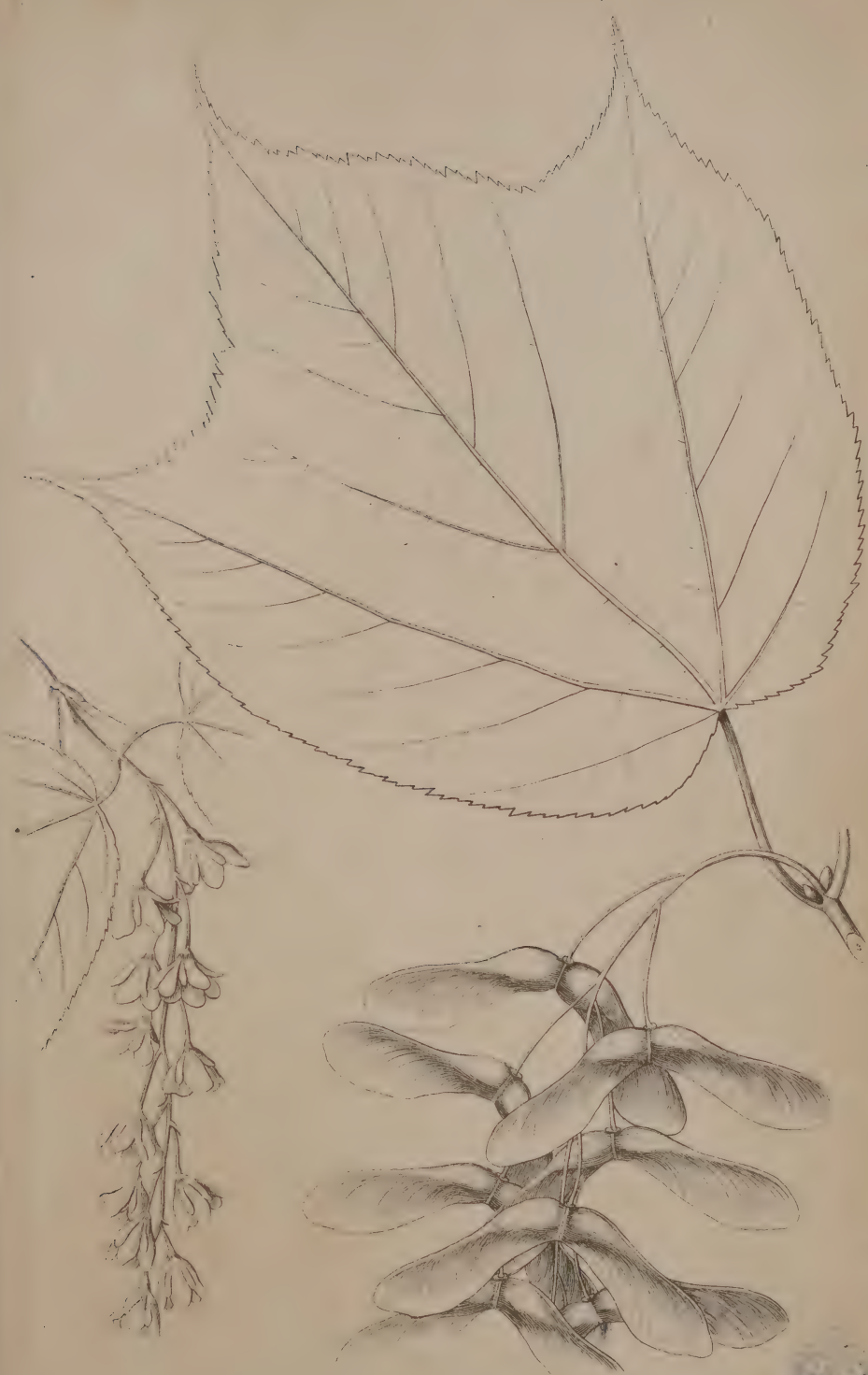
Sp. 4. THE STRIPED MAPLE. MOOSE WOOD. *A. Pennsylvanicum*. L.

Figured in Michaux, I., 245; Loudon, Arboretum, V., 28; and in our Plate.

This graceful little tree rarely attains to more than twelve feet in height: yet I have measured, among the Green Mountains, east of Berkshire, some stalks nearly twenty-four feet high; and a plant is now growing, within the college grounds at Cambridge, still taller.¹ It abounds in the woods in the western and middle part of the State, and in Essex County. In Maine, it is called Moose Wood; the bark and tender branches being the favorite food of the moose, and, in their winter *beats*, it is always found completely stripped. In Massachusetts, it is known by this name, and also by that of the Striped Maple.

When growing, as it commonly does, in the shade, the recent shoots are green, very smooth, hardly dotted. The branches continue of a light green, until the outer bark begins, in a year or two, to yield and cleave, the cellular substance showing itself white within, in longitudinal lines, which, afterwards

¹ This tree has been lost, or removed.



STRIPED MAPLE. (*Acer Pennsylvanicum*.)



MOUNTAIN MAPLE. (*Acer spicatum*)

turning brown, give rise to the beautifully striated appearance characteristic of the species. The leaves are opposite, — the united bases of the long, round footstalks embracing the branch, — large, ending in three long, acuminate lobes, sometimes five or seven, the primary veins being seven, finely and sharply serrate, heart-shaped or rounded at base, smooth, impressed at the veins above, paler, and with the veinlets ferruginous, downy or hairy, beneath; cicatrix of the bud leaves conspicuous, above which are two raised lines encircling the branch. Upper leaves often long and very narrow. Clusters of fruit pendulous.

I have no doubt, from what I have observed of this beautiful tree, that it might be easily trained to a height of thirty feet. I have found it growing naturally twenty-five feet high, and nineteen or twenty inches in circumference; and Mr. Bacon, of Richmond, tells me he has known it attain the height of thirty-five feet. It well deserves careful cultivation. The striking striated appearance of the trunk, at all times; the delicate rose color of the buds and leaves on opening; and the beauty of the ample foliage afterwards; the graceful, pendulous racemes of flowers, succeeded by large, showy keys, not unlike a cluster of insects, — will sufficiently recommend it. In France, Michaux says it has been increased to four times its natural size, by grafting on the sycamore.

There are few uses of this beautiful little tree. In the western part of the State, where it is well known, its leaves are successfully applied to inflamed wounds and bruises.

Sp. 5. THE MOUNTAIN MAPLE. *A. spicatum*. L.

Figured in Audubon's Birds, II., Plate 134; by Michaux, I., 253; Loudon, Arbo-
retum, V., 80; and in our Plate.

The Mountain Maple is a slender, small tree or shrub, usually rising eight feet or more, although it sometimes attains thrice that height, as I observed particularly in Becket. The recent shoots are of a fresh, light green, with an orange or purplish

shade, somewhat downy. Those of the previous year are of a light purple, smooth, with indistinct dots, blotched and striated below with green. The branches and trunk are of a clear, light gray, striate with olive above, and rough at base.

The leaves, which are heart-shaped at base, coarsely toothed, downy beneath, and divided into three or five lobes, which taper to a point, are on very long petioles, which become scarlet in September. The racemes are on the ends of the branches, the keys very divergent, and smaller than those of any other species.

The flowers are small, yellowish-green, very delicate, in an erect or nodding, slender, terminal raceme, five to six inches long. Partial flower-stalk a thread one third of an inch long. Calyx ending in five downy lobes, alternate with which are the slender, linear-lanceolate petals, broader at the end, half as long as the stamens. Stamens eight, rising from a glandular, yellow disk encircling the germ, which, in the barren flowers, is replaced by a tuft of white hairs. A few of the lower flowers in each raceme are usually fertile; and in them the centre of the much smaller disk is occupied by the two-pointed germ.

This plant, like the previous one, is rarely found except in the forest. It occurs in moist, rocky, mountainous land, in all parts of the State. It assumes, towards autumn, various rich shades of red, and, as sometimes seen, eighteen or twenty feet high, hanging over the sides of a road through woods, with its clusters of fruit beneath the leaves, turning yellowish when the leaf-stalks are scarlet, it has considerable beauty. Like the previous species, it may be much improved in size by engrafting on the larger species of maple.

Very nearly allied to the maples is the *Negundo*, Box Elder, which grows very readily and rapidly, and is perfectly suited to our climate. In its saccharine properties it is almost equal to the sugar maple; and excellent sugar has been made from its sap. It also furnishes good fuel.

CHAPTER VII.

POLYPETALOUS PLANTS, WITH STAMENS AND PETALS GROWING UPON
THE RECEPTACLE.

FAMILY XXXIV. THE SUMACH FAMILY. *ANACARDIACEÆ*.
R. BROWN.

THIS order includes trees or shrubs with a resinous, gummy, caustic, or milky juice; with simple or compound, alternate leaves, without stipules, and with axillary or terminal, mostly paniced, flowers. The flowers are perfect, or sterile and fertile on different plants, — distinct, regular; the calyx has five, or rarely, three, four, or seven, divisions; the petals, of the same number, are inserted, as are the stamens, into the bottom of the calyx; the stamens are as many as the petals and alternate with them, or twice as many or more, sometimes sterile, anthers opening inwards. Ovary solitary, free, one-celled; styles one or three, sometimes none; stigmas as many; ovule solitary, attached by a cord to the bottom of the cell. Fruit indehiscent, commonly like a drupe; embryo curved; cotyledons thick and fleshy, or leafy.

The plants of this type have small flowers, and abound in a resinous juice, sometimes acrid, and very poisonous. In several, the juice is white and clammy, and afterwards turns black, and may be used as varnish. The Marking Nut-tree, *Semecárpus anacárdium*, furnishes the celebrated varnish of Sylhet; and the Theet-see, *Melanorhœa usitatissima*, that of Martaban, and probably a black lac. All these varnishes are dangerous, and, when applied to the skin, often produce painful and extensive swellings. The most valuable varnishes of Japan and China are obtained from plants of this order. Mastich, and Scio turpentine, are the produce, severally, of *Pistácia lentiscus* and *terebínthus*. The seeds of the Cashew-nut and of the Pistacia-nut are eatable, and the fruit of the Mango delicious.

Chiefly natives of the tropics ; some specimens of *Rhus* are found in Europe, and several in North America ; and this is the only genus yet found in Massachusetts.

THE SUMACH. *RHUS*. L.

A genus of about eighty species of shrubs or small trees, found in temperate regions and near the tropics, on both continents, particularly in China and Japan, at the Cape of Good Hope, and in the United States. Their leaves are simple, ternate, or unequally pinnate ; and their flowers, which are small, but frequently form large, showy spikes, are either perfect, or, more often, sterile and fertile on different plants. They have five small, persistent sepals, united at base ; five ovate petals ; five, rarely ten, equal stamens ; one or three styles ; three stigmas. The fruit is a drupe, almost dry, often richly colored, with a bony, one-celled nut, and a solitary seed.

Several species of sumach have a milky, poisonous juice, turning black on exposure to air, and forming sometimes a varnish, sometimes an ingredient for indelible ink. A European species, the Tanner's Sumach, *R. coriària*, is valuable to the tanner, as is our common Stag's Horn Sumach.

Most of the species exhale a *terebinthine* odor when rubbed. Several of them contain an acrid juice, which causes painful eruptions. The precious varnish of Japan is said to be made from the juice of the Varnish Sumach, *R. vernicifera*, of that country.

Besides the native species hereafter described, the Venetian Sumach, *R. còtinus*, commonly called *Smoke-tree*, is much cultivated as a curious and beautiful plant. In Greece and Russia, it is used for tanning, and for dyeing a rich, beautiful yellow ; and in Italy, about Venice, for dyeing black, and also for tanning leather.

The Sumachs are much cultivated for their singularity, and the beauty of the foliage, especially in autumn, when it assumes



STAG'S HORN SUMAC. (*Rhus typhina*.)

the richest colors. The most elegant species cannot be safely admitted into gardens, on account of their poisonous qualities. The Dwarf Sumach deserves more attention than it has received. The larger species make a fine show at a distance, and are suitable to be left in the corners of fields and along avenues. They are easily propagated by seed, and some of them by cuttings of the branches. All the species are easily propagated by cuttings of the roots.

Sp. 1. THE STAG'S HORN SUMACH. *R. typhina*. L.

See our Plate.

This is a tall shrub, often becoming a small tree, sometimes of the height of twenty-five feet, with a diameter of four or five inches, with irregular, crooked branches. In July and August, the heads of fruit assume a rich scarlet or crimson color, afterwards turning purple, and remain conspicuous and beautiful into the winter, while, in autumn, the leaves begin early to turn, and become of a red color, with various shades of yellow, orange, and purple. The ends of the branches, from their irregularity and the abundant down with which they are covered, resemble the young horns of a stag, whence the name.

The flowers are yellowish-green, in a broad, tapering, branched panicle, five to twelve inches long, the common and partial stalks, like the leaf-stalks, clothed with a coarse, downy hair. Calyx short, hairy; the segments pointed, erect. Petals thrice as long, greenish-yellow, somewhat contracted at base, ovate, rounded, concave, hairy within, reflected, except at the tip. Stamens five, short, erect, rising from the edge of a broad, orange or scarlet disk; anthers large, opening inwards from top to bottom. Pollen orange. Stigmas three, on green styles, from the centre of the disk.

On the fertile plants, the stamens are usually wanting or very minute, and three short, purple stigmas crown a velvety

germ, clothed abundantly with crimson hairs. The pinnate leaflets are sessile, narrow, oblong-lanceolate, serrate, and terminate in a long point.

The wood is of a yellowish or greenish-yellow color, brittle, but of a soft, satiny texture and close-grained. The pith, which is abundant, is of a yellowish color.

The leaves and bark are astringent and used in tanning, and the root has been found efficacious in fevers. The juice is milky and abundant, very adhesive, and turning black on exposure to the air.

Sp. 2. THE SMOOTH SUMACH. *R. glabra*. L.

Figured in Catesby, Plate 104; and in Plate.

This is a handsome, spreading, leafy bush, usually four to six, rarely ten, feet high, with irregular branches, growing by the sides of woods and enclosures, or in barren fields, in dry situations, and distinguished by its smoothness, the purple stalks of its compound leaves, and a long head of yellowish-green flowers of an agreeable fragrance. The recent shoots are stout, smooth, and of a shining green.

The leaves are compound, often a foot or more long, with from thirteen to nineteen leaflets, on a large, smooth stalk, purple where exposed to light, swelling gradually towards the base, sometimes a little hairy between the leaflets. The leaflets are sessile, oblong-lanceolate, rounded at base or heart-shaped, gradually tapering to a long point, somewhat reflexed at the margin, with a few almost obsolete serratures, or nearly entire, or acutely serrate, smooth and dark green above, glaucous beneath. Buds conical, white, woolly, concealed within the swollen base of the leaf-stalk.

The flowers are in large, much-branched heads, from six to twelve inches long, on the ends of the branches; the compound branchlets of the flower-head alternating, as if they were the continuation of the leaves. The individual, sterile flowers are



Prague, del

Armstrong & Co. lith 166 Congress St Boston

SMOOTH SUMAC: (*Rhus glabra*.)

on a short, somewhat hairy pedicel, greenish-yellow ; calyx short, segments five, erect, triangular or oblong, and tapering, green ; petals of the same length or longer, concave, hairy within, ending in a pointed beak, bent inwards. Stamens short, issuing from beneath the edge of a scarlet, fleshy disk, and bearing large anthers, opening inwards. Styles three, scarlet, club-shaped, nearly as long as the stamens.

This plant sometimes overspreads considerable tracts in neglected fields, and by the toughness and size of its roots renders them difficult to be ploughed.

The velvety, crimson berries are astringent, and of an agreeable acid taste, for which reason they, as well as those of *R. copallina*, are sometimes used as a substitute for lemon juice, for various purposes in domestic economy and medicine, and to turn cider into vinegar. The acid is found to be the bi-malate of lime ; and, with a microscope, the crystals may be seen mingled with the down on the outside of the berries.

Prof. Wm. B. Rogers¹ recommends the following process for obtaining it perfectly pure : " A quantity of hot rain-water or distilled water is poured over the berries, in a clean wooden or earthen vessel. After allowing the berries to macerate for a day or two, the liquid is poured off, and evaporated carefully in an earthen or porcelain dish, until it becomes intensely acid. It is now filtered through animal charcoal or bone black, repeatedly washed with muriatic acid. The liquid passes through almost colorless, having only a slight amber tint. If the evaporation has been carried sufficiently far, a large deposit of crystals will form in a few hours. The liquid being poured off and further reduced by evaporation, an additional crop of crystals may be obtained, and in this way nearly all the bi-malate may be separated. The salt thus procured will often be slightly tinged with coloring matter, in which case it should be redissolved in hot water and crystallized anew. It is then perfectly pure."

¹ In Silliman's Journal, Vol. XXVII., p. 295.

The berries are also used in dyeing, and give their own color. Kalm says that the branches, boiled with the berries, afford a black, ink-like tincture.¹

The pith of this, as of the other sumachs, is very considerable. Of the wood, the outermost circles are white, the innermost of a yellowish-green. The wood burns well and without much crackling.

Sp. 3. THE MOUNTAIN SUMACH. DWARF SUMACH.

R. copallina. L.

See our Plate.

A beautiful plant, growing on dry, rocky or sandy hills or road-sides, usually to the height of three to five feet, — but sometimes, in favorable, protected situations, to eight or ten, sometimes eighteen or twenty, feet, — and four or five inches in diameter.

Branches and common footstalks of the leaves and flowers pubescent, dotted with brown. Leaflets nine to twenty-one, nearly sessile, oval-lanceolate or oblong-lanceolate, unequal at base, rounded below, often acute above, acute at the end, — the terminal leaflet acuminate, — entire, polished as if varnished above, lighter and somewhat downy beneath; footstalk conspicuously winged between the leaflets, and apparently jointed; becomes a deep purple. Flowers greenish-yellow, in a terminal panicle, the lower branches of which are in the axils of leaves.

In the sterile flowers, the calyx is five-parted, with ovate, concave, pointed, green segments. The petals of the corolla pale yellow, concave, obovate or wedge-shaped, at last reflexed. Filaments subulate, shorter than the alternate petals. Anthers attached by the middle. Pollen orange. Abortive pistil short, stigma reddish, three-cleft, on a reddish, annular disk. The panicle of the sterile flowers is very long, twelve to eighteen inches, with the stock very downy. The sterile flowers con-

¹ Kalm's Travels, I., 75.



tinue to open through August, while the fertile ones are almost mature.

The fertile flowers grow in much smaller panicles, three to six inches long, on shorter and less downy branches.

Fruit a somewhat compressed, short, ovoid drupe, surmounted by the trifid stigma and scattered with gray dots.

The berries have the same agreeable acid as those of the Smooth Sumach, and are used for the same purposes. In Mississippi and Missouri, the leaves are used by the Indians with, or as a substitute for, tobacco.

The varnished polish of the leaves, and the rich purple they assume in autumn, as well as the scarlet of the leafy heads of fruit, make this species one of the most beautiful of the genus.

Sp. 4. THE POISON SUMACH. *R. venenàta*. De Candolle.

Figured in Bigelow's Medical Botany, I., Plate 10; see our Plate.

I have followed Torrey and Gray in the name of this plant, as it is now ascertained that it is distinct from the true *R. vernix* of Linn., Mat. Med., — *R. verniciflora*, D. C., which it nearly resembles, and with which it was long confounded. This species and the next, both of them poisonous, are placed by Dr. Gray in a separate section — *Toxicodéndron*, Poison Tree.

The Poison Sumach, known also by the names of Dogwood and Poison Wood, is, perhaps, the most beautiful plant of the swamps. It rises, with a stem of light ash gray, to the height of eight or ten, sometimes of fifteen, feet, with a diameter of two or three inches, — in rare instances, these dimensions are doubled, — throwing out a few branches towards the top. The wood is brittle, and the stem full of pith. The recent shoots are rather stout and tough, purple, or green, clouded with purple, crowded with orange dots which soon change to an orange gray. The leaf-stalks are purple, or greenish-purple, or umber. The leaflets, three to thirteen in number, are nearly

sessile, varying from ovate to obovate, lanceolate, unequal at base, acute below, somewhat rounded above, pointed at the end or slightly acuminate, entire, margin somewhat reflexed, dark green, and with a rich polish, the veins of a purplish red above, much paler, sometimes downy, conspicuously reticulate beneath. The flowers, which are small and greenish-yellow, are in open, loose panicles, from the axils of the leaves. The sterile and fertile flowers are on different plants, the panicles of the latter eight or ten inches long, those with the sterile flowers still longer. At the base of the partial footstalks are slender, oblong, tapering bracts. The segments of the calyx are ovate, the petals usually curved; the stamens longer, and alternating with them.

“The fruit hangs in loose clusters from the axils of the leaves, on stems six or eight inches long, which remain on the tree after the leaves have fallen. The berries are about one fifth of an inch in diameter, slightly pear-shaped, unequal-sided, and somewhat flattened; smooth, and of a greenish white, when ripe.” — *Isaac Sprague*.

This is the most poisonous woody plant of New England. Some persons are so susceptible to its influence, as to be poisoned by the air blowing from it, or by being near a fire on which it is burning. The poison shows itself in painful and long-continued swellings and eruptions of the face and hands and other parts of the body. These effects are exasperated by smelling or handling the plant. Other persons handle and rub it, and even chew and swallow the leaves, with impunity. These opposite effects are sometimes produced on individuals of the same family. In some instances, persons ordinarily exempt from its effects have been poisoned by being exposed to its influence while in a state of perspiration.

Professor Hopkins, of Williams College, informs me that he has found a decoction of the root of the Indian Poke of the low grounds, *Veràtrum viride*, very efficacious as a remedy in cases of poison from this plant.



The near resemblance in all the properties of the Poison Sumach to those of the Varnish-yielding Sumach of Japan, from which, according to Thunberg, the best varnish of that country is obtained, has led to the belief that a similar substance might be procured from it. To this end, Dr. Bigelow made, in 1815, several experiments, which seem to establish this point in a manner very satisfactory.

“A quantity of the juice was boiled alone, until nearly all the volatile oil had escaped, and the remainder was reduced almost to the state of a resin. In this state, it was applied while warm to several substances, which, after cooling, exhibited the most brilliant, glossy, jet black surface. The coating appeared very durable and firm, and was not affected by moisture. It was elastic and perfectly opaque, and seemed calculated to answer the purposes of both paint and varnish.”

— *Med. Bot.*, I., 101, 102.

The poisonous property, as in most cases of vegetable poisons, seems to be removed by evaporation or boiling; and the dry varnish would probably be innocuous.

Sp. 5. THE POISON IVY. *R. toxicodéndron*. L.

Figured in Bigelow's Medical Botany, III., Plate 42; and in our Plate.

R. toxicodéndron and *radicans* of Linnæus and other authors. When climbing over rocks or on the trunks of trees, it seems to have been considered *R. radicans*; when standing by itself, and forced to erect a portion of its stem, *R. toxicodéndron*. I have never been able to find a precise distinction between the several forms of this plant, which pass into each other; and am glad to see that they are considered by Torrey and Gray as only varieties.

The Poison Ivy is a hardy plant, frequent in moist or shady places, climbing over rocks, to which it attaches itself by numerous radicles which penetrate the investing lichens, or over bushes and along the trunks of trees, often to a great height,

fastening itself to the bark so firmly that it breaks more readily than it is detached, and so closely as to impede the growth of the plant.

The leaves are in threes, on a petiole sometimes perfectly smooth, sometimes downy, flattened above. The leaflets are smooth and shining on both surfaces, broad-ovate, acuminate, entire or variously and irregularly toothed and lobed; the lateral ones nearly sessile, broader below; the terminal, on a stalk six to eighteen lines long, or sometimes closely sessile. The sterile and fertile flowers are on different plants, in panicles in the angle of the leaves or of the scales near the base of the recent shoots. The partial flower-stalks are very short; the calyx of the fertile flowers of five pointed, greenish-white segments, clasping the corolla of five whitish-yellow, veined, flat or reflexed, rounded or pointed, segments; stamens five, short, anthers orange, large, opening laterally; ovary ovate, with one large terminal and two smaller, lateral stigmas. The sterile flowers have a perianth of ten pieces, the two or three outer ones short, pointed, green; the next two or three wider and longer, resembling the five interior, which are ovate, white, veined with purple; stamens five, with flat anthers.

This plant, as its name indicates, is poisonous in the same manner as the Poison Sumach, but in an inferior degree. As is the case with all vegetable poisons, different constitutions are differently affected by it. All persons, probably, might be poisoned by it. My brother, W. S. Emerson, a physician, who had always handled it with impunity, wishing to ascertain this in his own case, scarified his arm and applied the expressed juice to the wounds. Within twenty-four hours, the arm began to swell and be painful, and in a few days an ulcer was produced on the scarified portion, painful, of long continuance, and very difficult to heal with the remedies — acetate of lead and corrosive sublimate — recommended in Dr. Bigelow's excellent account of the plant in his "Medical Botany."

The juice of this plant is yellowish and milky, becoming

black after a short exposure to the air. It has been used as marking ink, and, on linen, is indelible.

Sp. 6. THE FRAGRANT SUMACH. *R. aromática*. Aiton.

This plant has quite a different aspect from any of the sumachs previously described. I have not found it in the eastern part of the State; but Prof. Dewey tells me it grows near Williams College. It has long been cultivated at the Botanic Garden, Cambridge, where it is a straggling bush, four or five feet high, with a brown, smoothish stem, and somewhat numerous branches.

The leaves are ternate, on a short petiole; leaflets sessile, oblong-ovate or obovate, or rhomboidal, ciliate on the margin, with three or four rounded or obtuse teeth on each side, very downy on both surfaces when young, leathery and smooth after mid-summer. The yellowish flowers project, on a short footstalk, from the angular, hairy-edged, brown, imbricate scales of a catkin which grows on a short stalk from the axils of last year's leaves.

In the fertile flowers, the segments of the calyx are rounded, those of the corolla more than twice the length, oblong; the stamens wanting; the disk at the bottom of the cup crenate; the ovary egg-shaped; the styles three, short, with enlarged stigmas.

This plant is cultivated in England and France on account of the agreeable fragrance of its leaves when crushed.

FAMILY XXXV. THE PRICKLY ASH FAMILY. *XANTHOXYLA* CÆ. ADRIEN DE JUSSIEU.

A family of trees and shrubs, with aromatic, bitter, and pungent bark, leaves without stipules, alternate or opposite, simple, or, more commonly, unequally pinnate, with pellucid dots; and gray, green, or pink, axillary or terminal flowers. They are found most abundantly in America, particularly in the tropical regions; also in Africa and its islands, and in India and China. Flowers sometimes perfect, usually fertile and barren on different plants. Sepals three to nine; petals as many, or wanting; stamens as many, or twice as many. Seed-vessels two or more, on the receptacle, distinct, or more or less united; seeds one or two in each cell or seed-vessel, smooth and shining.

The only genus found in Massachusetts is

THE PRICKLY ASH. *XANTHOXYLUM*. L.

This is a genus of forty or fifty species of plants, chiefly American, and principally found within the tropics. Some of the species are powerfully sudorific and diaphoretic, and remarkable for their power in exciting salivation. Some furnish remedies to fever; others are used in dyeing yellow; and the wood of such as grow large enough is valuable for hardness and beauty. It contains trees or shrubs, having usually prickles on the branches and on the leaf-stems and the midrib of the leaflets. The leaves have from three to thirteen leaflets. The flowers are small, and greenish or whitish; the petals longer than the sepals, or wanting; stamens in the sterile flowers long, in the fertile, scale-like; ovaries one to five, distinct; seed-vessels crustaceous when mature, with or without a stalk, two-valved, one- or two-seeded.

THE PRICKLY ASH. *X. Americànum*. Miller.

Figured in Bigelow's Medical Botany, Vol. III., Plate 59.

When growing by itself, this is a low, much-branched, round-headed shrub or small tree, with an erect stem covered with a rather smooth, light gray, or, on the old stems, dark gray, bark. The recent shoots are brown, with a pulverulent surface. The buds are low, broad and round, of a crimson brown, with two short, sharp-pointed, stipular prickles or thorns just beneath. The leaves are made up of from three to thirteen nearly sessile, ovate-oblong, acute, almost entire leaflets, somewhat downy beneath, and oftentimes armed with prickles, which are mostly near the base of the leaflets. The flowers expand in April or May, before the leaves, in short umbels, from the axils of the leaves. Each fertile flower has from three to five ovaries, on short stalks, which, when mature, become so many two-valved capsules, each containing a shining, blackish seed. The valves are covered with a pitted, brown or reddish rind, fragrant, when rubbed, with an agreeable, lemon-like, aromatic odor. The bark is bitter and pungent, and has been much used, in tincture or in powder, in rheumatic affections. The wood is of a yellow color, whence Mr. Colden gave it the name *Xanthoxylum*, which signifies *yellow* wood.

I have found it growing in only one place, on a southern slope in Medford. It is there very abundant, growing single, or in little clumps or thickets, to the height of four or five feet. When cultivated, it is sometimes twenty feet high. It invites cultivation as a hedge-plant.

FAMILY XXXVI. THE LINDEN FAMILY. *TILIACEÆ*.

JUSSIEU.

More than thirty genera belong to this family, including as many as two hundred species, of which five sixths are found within the tropics. More than twenty of the genera contain trees or large shrubs; but a great portion of the species are unimportant plants, with pretty, sometimes beautiful, pink or white flowers. All have a mucilaginous, wholesome juice; the berries of some are eatable; all are remarkable for the toughness of the fibres of the inner bark. The wood is generally very light and soft, but applicable to important uses. They have alternate leaves, with deciduous stipules; and axillary flowers, with a calyx of four or five sepals, a corolla of four or five petals, with glands or scales at base, and numerous distinct stamens; the ovary of two to ten united seed-vessels, with styles united and stigmas distinct. The fruit is dry, or, very rarely, like a drupe or berry, with usually several cells, sometimes a single cell, containing one or more seeds.

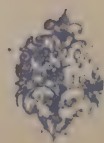
The only genus of this family belonging to Massachusetts, is

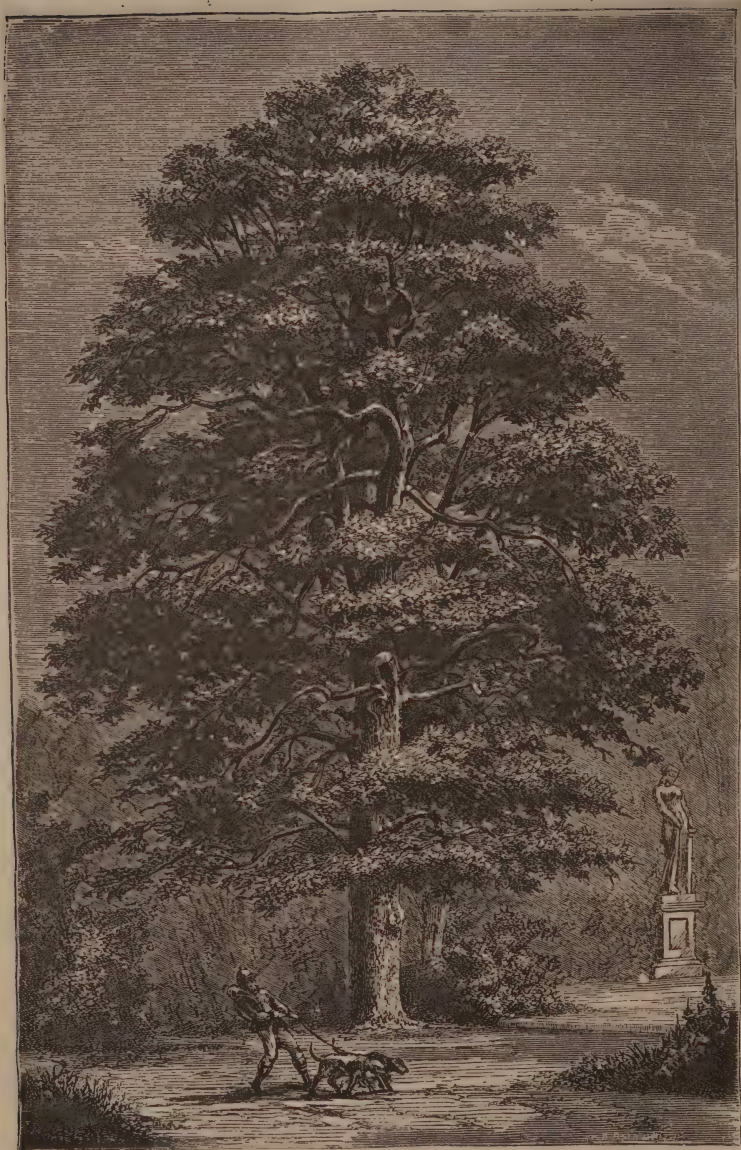
THE LINDEN OR LIME TREE. *TILIA*. L.

This includes nine or ten species of trees with heart-shaped leaves, and a tough, fibrous bark; with cymose flowers, the stalk of which is attached to a large, colored, leaf-like bract. The flowers have five sepals, five petals, and numerous stamens in five parcels, the central one in each parcel usually transformed into a petal-like scale. The ovary is sessile, globose, villous, five-celled; the cells with two ovules. The fruit is coriaceous, paper-like, or woody, nearly round, one-celled, one- or two-seeded.

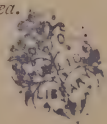


LIME TREE OR LINDEN. *Tilia Europaea.*





EUROPEAN LINDEN. *Tilia Europæa.*



The species are found in the temperate regions of America, Europe, and contiguous Asia; and, for the beauty of the broad, unbrageous head, the toughness and pliability of the fibres of the inner bark, the adaptedness of the soft wood to the uses of the sculptor, and the sweet fragrance of the flowers, these trees have long been familiar favorites with the inhabitants of those regions.

There are several species in Europe, by some writers considered as varieties of a single species, of which individuals are among the most remarkable trees in that region for age and size. One, of unknown age, which has given its name to an ancient town in Wirtemberg, has a circumference of fifty-four feet, and branches extending in every direction one hundred feet, and sustained by one hundred and eight wooden and stone pillars. A lime tree in Berkshire, England, known to be more than two hundred years old, has a diameter of twenty-two feet ten inches at one foot from the ground.

The honey made by bees feeding on the flowers of the European lime tree, is very excellent. An infusion of the flowers has long held, and deservedly, wide reputation as an antispasmodic medicine. The sap yields a considerable proportion of sugar, and is made, by fermentation, into an agreeable vinous liquor. A substance like chocolate has been made of the ripe fruit, but has the inconvenience of not continuing sweet. The wood was used by the ancients, according to Pliny, for bucklers, on account of its flexibility, lightness, and resiliency; and the bark, to cover cottages, and form baskets; and the inner bark was employed, under the name *Philyra*, to write on, and also, as in modern times, as a material for mats. The European Lime tree has been long cultivated in this country, and is perfectly adapted to our climate. Both this and our native linden are attacked and often destroyed by the *Saperda vestita*, of which an account is given by Dr. Harris (pp. 109-111). They are also sometimes a good deal injured by the *Ladder Chrysomela* (Ib. 132).

Only one species is found growing naturally in New England; three others occur in the Western and Southern States; which do not remarkably differ from ours. A beautiful variety of the European species, called the Golden-twiggèd, would be a valuable addition to our ornamental trees.

THE LINDEN TREE. LIME TREE. BASS WOOD.
T. Americàna. L.

Figured in Michaux, Plate 131; and in Loudon's Arboretum, V., Plate 24; and in our Plate.

From a powerful root which penetrates deep or spreads wide, this tree rises to a considerable height, with an even, erect, pillar-like trunk, and many branches. When growing freely by itself, it often assumes a conical form of striking regularity. Standing, as it often does, on the side of a steep hill, with its feet almost in the water, it throws out branches horizontally, with large, rich, thick masses of foliage, forming a beautiful and striking object when seen from a distance.

The bark is less rugged than that of almost any other tree, — except the beech: on the young shoots, it is of a dark brown or brownish-gray color, which gradually changes, on the larger, to a light ash gray. The dark color of the young shoots, by which it is readily distinguished from the European species, has gained for it, in England and France, the common name of the Black Lime Tree.

The leaves are roundish in their outline, heart-shaped or obliquely truncate at base, inequilateral, — the side nearest the branch the largest, — acuminate, serrated with sharply acuminate serratures, smooth on both surfaces, with minute tufts of russet down at the axils of the nerves and veins beneath; of a deep green above, paler beneath, of soft, membranaceous texture, four or five inches long and equally wide. In autumn, they turn to a lemon yellow color. The leaf-stalk is half the length of the leaf, and smooth. Flower-stalk as long as the leaf, smooth, twice or thrice trichotomous at the



Flower

Stamen and pistil enlarged 10 times

AMERICAN LINDEN. (*Tilia Americana*)



end, rising from the upper axil of the leaf, pendulous, attached, for half its length, to an oblong, membranous, ribbon-like, pale-straw-colored bract, as long as itself. The flowers, which are from nine to twenty-seven, are yellowish white and fragrant. The fruit is a woody or bony, pubescent, roundish, gray nut, one fourth of an inch in diameter, containing one seed. It flowers in July and August, and ripens its fruit in October.

The wood of the lime tree is soft and white, and of a fine, close grain. It is softer and more tough and pliable than almost any other wood, and is much used for the panels of carriages and wagons. It is also used by cabinet-makers for the bottom and sides of drawers, and for similar purposes. Where pine is scarce, bass wood boards are used as a substitute, by house-carpenters, for interior finishing. For certain purposes, it is preferable to pine, on account of its very great toughness and pliability. It is, therefore, much used by stair-builders for the curved ends of stairs. It is well adapted to carving and turning. Small boxes and wooden bowls are sometimes turned of it; and, on the Ohio River, Michaux says it was formerly employed as the material from which the figure-heads for prows of vessels were carved. It forms a better charcoal than most of the soft woods. The charcoal made from the European lime tree, which ours very much resembles, is said to be preferred even to that of the alder, in the manufacture of gunpowder. In some parts of the country, the bark is separated, by maceration, into fibres (bass or bast), from which a coarse cordage is made. In Russia, mats are manufactured from the inner bark of the European tree, similarly prepared, divided into narrow strips, and dried in the shade. These are often imported into this country and used for binding packages, and by gardeners for confining plants, or for tying bundles. In Sweden, the fibres of the bark serve for fishing nets; in Carniola, they are converted into a rude cloth which serves the shepherds for clothing.

The flowers of the lime tree are remarkable for their agreeable fragrance, which is often perceptible at a considerable distance. They are the favorite resort of bees, which travel some miles through the woods to reach them, by paths which seem to be as well known and as constantly traversed as the more visible ones on the ground below. Invisible as they are, the travellers upon them are sometimes waylaid by the bee-hunters. The lime forests of Lithuania have a similar attraction for the bees of that country, which extract thence a honey said to be preferred to every other, and to command a threefold price.

As an ornamental tree, the lime is to be recommended where the object is to obtain a great mass of foliage and a deep shade. No other native tree surpasses it in the abundance of its foliage. The appearance of the tree in winter shows the reason. The branches divide and subdivide into very numerous ramifications, on which the spray is small, thick, and set at a large angle. This becomes profusely clothed with leaves, which are large and of a deep green. It also has the advantage of being easily transplanted, and of growing readily on almost every kind of soil, though it flourishes best on a rich, rather moist, loam. These qualities adapt it admirably for being used as a screen, as a welcome shade for cattle, or as a shelter to protect more tender trees against the wind. It might, therefore, be planted to supply the place of the native forests, in situations where fruit trees are suffering from being deprived of this protection. Its growth is very rapid, it bears pruning almost to any extent, and may be trained to grow as tall or as low and bushy as may be required.

It may be propagated by layers, by shoots, or by seed. The following method is recommended by Hunter, the editor of Evelyn, as successful in raising from seed: "The seeds being ripe in October, let a dry day be made choice of for gathering them. As these grow at the extremity of the branches, it would be tedious to gather them with the hand: they may, therefore, be beaten down by a long pole, having a large win-

nowing sheet, or some such thing, spread under the tree to receive them. When you have got a sufficient quantity, spread them in a dry place for a few days; then having procured a spot of rich garden ground, and having the mould made fine by digging and raking, let it be raked out of the beds about an inch deep. These beds may be four feet wide, and the alleys a foot and a half. After the mould is raked out, the earth should be gently tapped down with the back of the spade, to make it level; then the seeds should be sown, at about an inch asunder, all over the bed, gently pressing them down, and covering them about an inch deep. In the spring of the year, the young plants will make their appearance; when they should be constantly kept clean from weeds, and gently watered in very dry weather. In this seminary, they may stand for two years, when they will be fit to plant in the nursery; at which time they should be carefully taken up, their roots shortened, and the young side-branches, if they have shot out any, taken off. They must be planted in the nursery ground in rows, two feet and a half asunder, and one foot and a half distant in the rows. There they may stand till they are of proper size to be planted out for good; observing always to dig between the rows every winter, and constantly to keep the ground free from weeds."

As plants raised from seed are of comparatively slow growth, the French gardeners, according to Du Hamel, employ the following mode of propagation, which may be easily practised in our native forests, where this tree is remarkable for the abundant shoots from the stumps. They cut an old tree close to the ground, which soon sends up a multitude of shoots. "Among these, they throw a quantity of soil, which they allow to remain two or three years; after which they find the shoots well rooted, and of a sufficient height and strength to be planted at once where they are finally to remain." This mode is also practised with the elm.

Hunter gives the following directions for forming layers from

shoots of the American lime: "When the layering of these is to be performed, which ought to be in the autumn, the strong two years' shoots must be brought down; and if they are stiff and do not bend readily, they must have a gentle splash with the knife near the bottom; a slit should be made at the joint for every one of the youngest twigs, and their ends bent backwards that the slit may be kept open. This being done, the mould must be levelled among the layers, and the ends of them taken off to within one eye of the ground. The business is then done; and the autumn following they will have all good roots, many of which will be strong, and fit to plant out for good, whilst the weakest may be removed into the nursery ground, in rows, to gain strength."

The lime tree is found from Canada to Georgia; most abundantly on the shores of Lake Erie and Lake Ontario. I have observed it, in almost every part of this State, sometimes growing vigorously even in the most sandy and exposed situations. It appears to be very little affected by the sea-breeze, and might, probably, without much difficulty, be made to grow on Nantucket and amongst the sands of Cape Cod.

I cannot give the dimensions of many large trees of this kind. Mr. Austin Bacon, of Natick, has favored me with the account of one of a size somewhat remarkable. It is sixteen feet six inches in circumference at the ground, and thirteen feet four inches at four feet. Near by is another of almost equal dimensions.

FAMILY XXXVII. THE ROCK ROSE FAMILY. *CISTACEÆ*.
JUSSIEU.

This family is of interest to florists and gardeners for the great beauty, variety, and elegance of its flowers. It contains herbs or low shrubs, with simple, usually entire, leaves, generally opposite, — in a single genus, partly alternate, — and with or without stipules. The flowers are perfect; yellow, white, rose-colored, or red; transient, — usually lasting, except in *Hudsonia*, but a day, often but an hour. The calyx is of five, persistent sepals, the two outer usually much smaller, sometimes bract-like, sometimes wanting, the three inner imbricated and somewhat twisted before opening. The corolla has five petals, — rarely three — sometimes none, crumpled before opening, and twisted in a direction opposite to that of the sepals. The stamens are numerous and distinct, with short anthers. The ovary is made of three to five united vessels, surmounted by a single style and one or more stigmas. The fruit is a many-seeded capsule, with from three to five valves, with imperfect divisions at the middle of the valves, bearing near the central line the seeds, which are smooth and angular, with a curved or spiral embryo in the midst of mealy albumen. The properties are not known, except in certain species, which exude an odoriferous, balsamic resin, called *lábdanum* or *ládanum*.

The *Cistaceæ* are mostly confined to the temperate regions of the northern hemisphere, and abound especially in the countries bordering on the Mediterranean Sea. A few species are found in Mexico and the United States. The genera found here are *Heliánthemum*, *Lechæa*, and *Hudsonia*.

XXXVII. 1. THE SUN ROSE. *HELIA'NTHENUM*.
Tournefort.

This genus contains a large number of beautiful species, much cultivated, delighting in dry and sunny situations; and

therefore chosen, together with the Rock Rose, *Cistus*, to ornament rock-work, and plots in dry, sandy soils. The two exterior sepals are very small and bract-like, or wanting. The petals are five, rarely three, sometimes none; the stigmas three, large, fringed, more or less united into one. The capsule is triangular, three-valved, with few or many seeds attached to central threads or on imperfect divisions projecting into the cell.

THE CANADA SUN-ROSE. *H. Canadénse*. Michaux.

Figured in Sweet's *Cistaceæ*, Plate 21.

Flowers of two kinds; the primary or terminal, large and petaliferous, flowers few or solitary, on peduncles scarcely longer than the flower, the petals about twice the length of the calyx; secondary flowers axillary, very small, nearly sessile, solitary, or somewhat clustered, on short, leafy branches, the petals very small or none, and the outer sepals usually wanting; leaves oblong or somewhat lanceolate, with revolute margins; and, as well as the sepals, and often the branches and peduncles, canescently tomentose. — *T. & G., Flora*, I., 151.

An erect, downy plant, about a foot high, found in dry, sandy places, among rocks, and remarkable for its flowers of two kinds. The earliest, which appear in May and June, are terminal or lateral, solitary, and look like a miniature yellow rose, with three or five wedge-shaped petals, and many stamens inclined to one side; the two exterior sepals are linear, the three interior broad-oval, pointed, concave, downy without. The individual flowers are fugacious, but succeed each other from day to day. The later flowers as above described, but much smaller.

There are two marked varieties in the neighborhood of Boston: The one is smoothish below, with hair in scattered tufts, stem very slender, leaves rather rigid and smooth above; flowers solitary, in the angle of the upper leaves, appearing in May and June: *H. Canadénse* of Pursh.

On the other, the hairs are short, densely tufted, the stem short, leaves downy or dusty on both surfaces; flowers in terminal corymbs, succeeding each other in June and July: *H. ramuliflorum*, Pursh?

XXXVII. 2. PIN-WEED. *LE'CHEA*. L.

An American genus of a few species of perennial, much-branched herbs with woody roots, and small, brownish-purple flowers, in racemes or panicles; and entire, alternate, opposite or whorled leaves, without stipules. The sepals seem to be three, the two exterior being very narrow and bract-like; the petals are three, small and narrow; stamens usually three, sometimes more; capsule incompletely three-celled, three-valved, with three other apparent valves within, one- or two-seeded. Found on dry, rocky hills and sunny fields.

Sp. 1. LARGE PIN-WEED. *L. Major*. Michaux.

A stiff, hairy plant, with a purple, brittle, erect stem, one or two feet high. The leaves are reflexed at the margin, downy, whitish beneath. The lower branches spread on the ground in tufts, with small, roundish leaves. The stem has longer and more pointed leaves; the upper branches, lanceolate leaves; the flowers are small and very numerous, densely crowded on the sides of the upper branches, and succeeded by three-sided, roundish capsules, about the size of a large pin's head.

Sp. 2. THYME-LEAVED PIN-WEED. *L. thymifolia*. Pursh.

A plant about a foot high, with a stout, erect stem, and numerous, somewhat whorled branches, forming a small, pyramidal head, with sharp, straight, narrow leaves; the whole covered with whitish wool. It is intermediate between the last species and the next. It is found in sand on the sea-coast.

Sp. 3. SMALL PIN-WEED. *L. minor*. Lamarek.

A plant smaller than the two preceding species, resembling them strongly, but distinguished by being less hairy, by having its flowers and capsules larger, and by having a somewhat more slender and delicate appearance. The capsules are nearly globular, about the size of a grain of mustard.

XXXVII. 3. THE HUDSONIA. *HUDSONIA*. L.

An anomalous American genus of three species of excessively branched, woody, tufted, heath-like undershrubs, with small, stiff, sessile, awl-shaped or needle-shaped, densely imbricated, persistent, downy leaves, without stipules; and small yellow flowers with reddish calyx, on the ends of very short branches. Sepals five, united at base, the two outer ones awl-shaped and minute, the three inner oblong, expanded at flowering, forming a tube in fruit. Petals five. Stamens nine to thirty. Capsule oblong-obovate, slightly three-sided, one-celled, three-valved, usually three-seeded.

Sp. 1. THE DOWNY HUDSONIA. *H. tomentosa*. Nuttall.

Figured in Sweet's Cistaceæ, Plate 57.

A creeping, underground stem extending to no great distance, and throwing out many long, tapering roots, branching with thread-like fibrils. The stem rises a few inches from the ground, erect or bending downwards, and throwing out innumerable short branches, thickly clothed with a sad, whitish or glaucous down, and close-set leaves of the same color. Leaves very short, lanceolate, pointed, imbricate, and closely embracing the stem, — covered with down of a whitish color, through which the greener surface indistinctly appears.

Among these appear, in May, yellow flowers, on very short, slender stalks, at the ends of the little branches near the

extremity of the stem. The sepals look like the continuation of the leaves, being covered with down without, but yellow or reddish within. The petals are yellow. Stamens from nine to eighteen, with roundish anthers. It flowers from May to July.

In some places near the coast, in Essex County, this plant covers the sand, where scarcely any other would vegetate.

Sp. 2. THE HEATH-LIKE HUDSONIA. *H. ericoides*. L.

Figured in Sweet's Cistaceæ, Plate 36.

This is much less downy than the last, and the slender, awl-like leaves, three or four lines long, spread a little, and are covered with longer and thinner hairs. It is from six to twelve inches high. The old, persistent leaves give the stem a brown color. The flowers are like those of the last species, and have from nine to fifteen stamens.

It is found in Martha's Vineyard and on Nantucket, flowering in May and after.

FAMILY XXXVIII. THE BARBERRY FAMILY. *BERBERIDACEÆ*. R. BROWN. •

A family containing eleven or twelve genera of herbs or shrubs of very various appearance and character, frequently thorny, with alternate, petiolate, pinnate, or simple leaves, often with spiny or pointed serratures, with yellow, white, or red flowers; mostly natives of mountainous places in the temperate parts of the northern and southern hemispheres, and of the mountains of tropical America. The sepals are deciduous, from three or four to nine, in one, two, three, or four series, often colored; the petals as many as the sepals and opposite them, or twice as many, frequently glandular or appendaged at base within; stamens as many as the petals and opposite them or twice as many, with their anthers opening with recurved valves; that is, each lobe of the anther opening at the edge throughout, except at the upper point, where it remains attached and rises to allow the pollen to escape; filaments often irritable. The ovary is solitary, one-celled. Berry or capsule one-celled, one- or few-seeded.

The berries of some of the species abound in an agreeable oxalic acid; the bark of the same is bitter and astringent. Others have purgative properties.

THE BARBERRY. *BERBERIS*. L.

A genus of about forty species of shrubs, belonging to the temperate regions of both hemispheres, or to high mountains within the tropics; either with the primary leaves wanting or changed into single or compound spines in the axils of which the secondary leaves, formed by the development of the leaf-buds and simple, are in rosettes or tufts; or with the primary leaves developed and pinnate; often with minute stipules; flowers yellow, with irritable filaments. The sepals are nine, in three series, the three exterior, small, bract-like; the petals

six, with two glands at the base; stamens six; stigma orbicular, nearly sessile; fruit a one- to nine-seeded berry, with erect seeds. The wood of the root and the inner bark of the stem are of a bright yellow, and abound in yellow coloring matter. The fruit, leaves, and young shoots contain a great deal of oxalic acid; the bark of the root is bitter and astringent.

Many of the species are cultivated in the gardens of Europe for the beauty of their flowers and foliage. Of these the most valuable are the Chinese, the Emarginate-leaved, the Nepaul, and two beautiful evergreen species, with compound leaves, natives of Oregon, and brought thence by Lewis and Clark, which would doubtless flourish in our climate. These were separated from the barberry, by Nuttall, under the name of *Mahonia*. A third, more beautiful than all, comes from the mountains of California.

All the species throw up numerous suckers, by means of which they may be readily propagated, as they may also by seed.

THE COMMON BARBERRY: *B. vulgaris*. L.

Figured in Audubon's Birds, II., Plate 188.

Every one who is an observer of nature, must have been struck, in June, with the beauty of the arching upper shoots of the barberry, springing from a mass of rich green, and sustaining numerous, pendent racemes of splendid yellow flowers. It is hardly less attractive when its blossoms have been succeeded by clusters of scarlet fruit.

The barberry is a bush of usually four or five, but often seven or eight, feet in height, and two or three inches in diameter, with a whitish or light-gray, shining bark on the recent shoots, and a much darker gray on the old stems. The principal stem is upright and very much branched towards the top. It is armed with single or sometimes triple spines, in the axils of many of which, at intervals of an inch or more, are tufts

of leaves, from the centre of some of which issues a raceme of flowers. The leaves are inversely ovate, with numerous, bristly, soft serratures. It flowers in May and June, and the scarlet berries ripen in autumn, but often remain on the plant through the winter. The roots are very long and crooked, and covered with a wrinkled bark; the wood within is of a bright orange or yellow, and very soft. The wood of the stem is also yellow; it is hard and brittle, and little used, in this country, except in dyeing yellow. But it is much sought for by turners, on the continent of Europe, on account of its unusual and beautiful color. The pith is white.

The barberry is found growing in exposed situations, on the borders of woods and along road-sides, in gravelly soil, in many parts of Massachusetts and New England, along the coast; as also in Canada and Newfoundland.

The remarkable irritability in the stamens of the common barberry, as well as in those of some other species, was first noticed by Kölreuter. "The stamens, when the filament is touched on the inside with the point of a pin, or any other hard instrument, bend forward towards the pistil, touch the stigma with the anther, remain curved for a short time, and then partially recover their erect position. This is best seen in warm, dry weather. After heavy rain, the phenomenon can scarcely be observed, owing, in all probability, to the springs of the filaments having been already set in motion by the dashing of the rain upon them, or to the flowers having been forcibly struck against each other. The cause of this curious action, like that of all other vital phenomena, is unknown. All that has been ascertained concerning it is this, that the irritability of the filament is affected differently by different noxious substances. It has been found, by Messrs. Macaire and Marcet, that if a barberry is poisoned with any corrosive agent, such as arsenic or corrosive sublimate, the filaments become rigid and brittle, and lose their irritability; while, on the other hand, if the poisoning be effected by any

narcotic, such as prussic acid, opium, or belladonna, the irritability is destroyed by the filaments becoming so relaxed and flaccid that they can be easily bent in any direction. It is difficult to draw from this curious fact any other inference than this, viz., that in plants, as well as in animals, there is something analogous to a nervous principle, which is more highly developed in some plants, or in some organs, than in others." — *Lindley in Loud. Arb.* 300.

The barberry is found in most parts of America and Europe. In Poland, it is used to tan leather, which it at the same time dyes a fine yellow color. The tannin principle is found in the bark, and the coloring matter both in the bark and in the wood and the bark of the root. In this Commonwealth, it is much used to give a yellow color to leather.

The leaves have an agreeable acidity, and have sometimes been used as a substitute for sorrel. The berries, which are so exceedingly sour as to need no protection against birds, are sometimes pickled; they are also preserved in various ways with sugar, and then are considered pleasant and wholesome. In some parts of Europe they supply the place of lemon in flavoring punch. Bruised, they make a refreshing drink in fevers. The bark has been used for its purgative and tonic qualities; and various parts of the plant, for their great astringency.

The barberry is admirably well adapted to enter into the composition of a hedge, from the multitude of its shoots and the sharpness of its spines. There is, however, in this country as well as in England, a prejudice against it, from the belief that it produces the blight in wheat. Prof. Martyn urges against this opinion, the fact that it abounds in the hedges in Saffron Walden, in Essex, England, which enclose fields in which wheat is cultivated constantly and with entire success. And Dr. Greville, in his "Scottish Cryptogamic Flora," has shown that the mildew which attacks the barberry (*Æcidium berbéridis*) is quite different from the fungus which occasions

mildew in wheat, which is a kind of *Uredo*, entirely remote in its botanical characters from an *Æcidium*.

In the neighborhood of Boston the barberry propagates itself readily and rapidly by seed, and by the multitude of suckers which it throws up. In those parts of the State in which it has been found by experience that wheat is not a profitable crop, there can be no objection, on the score of its danger, to the use of the barberry as a hedge. The beauty of the plant, the rapidity of its growth when young, its durability, — for a stock, though so easily established, lives very many years, — Loudon says, one or two centuries, — the sharpness and great number of its prickles, the closeness with which it springs up, and the readiness with which it submits to the knife, are strong recommendations. On some lanes in Brookline and other places in the vicinity of Boston, a natural hedge of barberry, sweet briar, wild rose, and privet has formed a most graceful border for the road-side. This, which gives an air of wildness and retirement perfectly suited to the purpose for which much of this shrub is used, has in several places been made to give place to the stiff, pudding-stone wall; — and the change is called *improvement*.

If the suckers and lower branches are removed, and only the upper branches allowed to grow, the barberry forms a very beautiful little tree, and sometimes shoots to the height of ten feet. At times we find such a tree by the road-sides, surprising us by its gracefulness and the beauty of its bright yellow flowers in June, and of its rich scarlet berries and its fading orange-scarlet leaves in autumn.

FAMILY XXXIX. THE MOONSEED FAMILY. *MENISPERMA'CEÆ*. JUSSIEU.

A family of about one hundred species mostly of twining shrubs, belonging almost entirely to the torrid zone; with simple, rarely compound, palmately veined leaves, without stipules; and minute flowers in panicles or racemes. Male and female usually on separate plants; sepals three to twelve, in one, two, or three rows, deciduous; petals half as many or as many as the sepals and opposite them, sometimes united, rarely wanting; stamens as many as the petals, and opposite them, or two to four times as many, distinct or united, anthers one-, two-, or four-celled; ovaries one or more, one-celled. The fruit is a one-seeded, lunate drupe, containing a bony nut, with the embryo usually curved.

Many of the species are remarkable for their astringent and tonic properties, which render them valuable remedies in fever and in dysentery. One of the most important of these is Colombo root, from the *Cocculus palmátus*, a native of Mozambique. The seeds of other species are narcotic, like *C. Indicus*, used to poison or intoxicate fishes; while the fruits of others are eatable.

MOONSEED. *MENISPERMUM*. L.

Climbing shrubs of North America and Central Asia, with alternate, peltate, or heart-shaped, smooth, entire leaves, and small, yellowish flowers, in axillary or supra-axillary racemes. The male flowers have four to twelve sepals, in two to four rows, as many petals or none, and ten to thirty distinct stamens with four-lobed anthers; the female flowers, somewhat larger, four to six sepals in two rows, as many petals, and two to four one-celled ovaries. The drupes are solitary, or in twos or fours.

CANADA MOONSEED. *M. Canadénse.* L.

A twining plant, with a smooth, woody stem, eight to twelve feet long, climbing over shrubs, on the banks of rivers and in thickets. The leaves are peltate or shield-like, three or four inches long, and rather broader, with three to five angular lobes, with the leaf-stem, which is one or two inches long, inserted near the base, bright green above, pale and very strongly nerved beneath. The flowers are greenish-yellow, in small racemes, which come out a little above the axil of a leaf. The fruit is a drupe, nearly black when mature, and containing a lunate nut.

FAMILY XL. THE MAGNOLIA FAMILY. *MAGNOLIACEÆ*.
JUSSIEU.

This family comprehends about fifty species of trees and shrubs, among which are many of the most magnificent of the vegetable kingdom. They abound in tropical Asia, and the warmer parts of North America. This State is their most northern limit. Advancing southward, they become more numerous, and reach their highest perfection in the Southern and South-western States. A few are found in the West Indies and in South America, and in Japan, China, New Zealand, and New Holland. Their leaves are large and showy, alternate, simple, coriaceous, mostly very entire, dotted most frequently with pellucid dots, and, before opening, protected by two ample, deciduous stipules, convolute and terminating the branches with a conical point, and, when fallen, leaving a lasting annular mark. The flowers are of extraordinary size and splendor, and generally exhale a delicious fragrance, which often acts powerfully upon the nerves. Almost every part of the plant, especially the bark and the fruit, is highly aromatic and tonic, the bark containing a bitter principle, which has often been used as a substitute for Peruvian bark, on account of its stimulant, stomachic, febrifugal properties.

The flowers are distinguished by having a calyx of three or six sepals, which fall as they expand; a corolla of from three to thirty petals, usually disposed in threes; very numerous stamens, with long, close anthers; and one, a few, or, most commonly, very many ovaries arranged on a central cone. The fruit consists of numerous one- or two-seeded vessels, aggregated or grown together like the strobile of a pine; embryo minute, at the base of fleshy albumen.

Of this family, there are two genera found growing in Massachusetts; the

Magnolia, distinguished by its seed-vessels opening to allow the escape of the seed; and

The Tulip Tree, *Liriodéndron*, with seed-vessels not opening; and with leaves truncate at the end.

XL. 1. THE MAGNOLIA. *MAGNOLIA*. L.

This genus, named for Magnol, a distinguished botanist of Montpelier, in France, contains trees, except *M. glauca*, — which in the Northern States is only a shrub, — all of them beautiful and some of them among the finest and most splendid trees that are known. It is distinguished by having a calyx of three caducous sepals, resembling petals, and a corolla of three to twelve deciduous petals. The carpels are one- or two-seeded, opening by the external angle, and permanent, and forming a fruit like the cone of a pine. The seeds are like a berry, somewhat heart-shaped, and hanging suspended, when ripe and escaped from the carpel, by a long, slender thread.

There is only one species known as naturally growing in Massachusetts; but several others, and those among the most beautiful, may be cultivated.

The Cucumber Tree, *Magnolia acuminata*, is found, according to Dr. Torrey, in New York, and may, probably, hereafter be found, scattered in favorable situations, in the western part of the State. It grows perfectly well at the Botanic Garden, at Cambridge. Michaux says it is one of the most magnificent trees in North America. Its large flowers, five or six inches across, are very conspicuous, among its ample foliage, as is its cylindrical fruit, three or four inches long, with the scarlet seeds depending from it. But its branches are long and bare, except at the end; and it wants much of equalling, in grace, fulness, and beauty, the greater part of our forest trees.

A much more beautiful tree, as it grows here, for shape, foliage, and flowers, is the Long-leaved Cucumber Tree, *M. auriculata*. It grows readily, but attains not a great height.

The Three-petalled, the Heart-leaved, the Yulan, and the Purple, may also be cultivated. They are propagated by seed,





by layers, or by inarching ; and, while young, are best preserved in pots.

THE SMALL MAGNOLIA. SWAMP LAUREL. *M. glauca*. L.

Figured in Michaux, Sylva, II., Plate 52; in Bigelow's Medical Botany, II., Plate 27; and in Catesby's Birds, Plate 39.

A sheltered swamp near Cape Ann, not far from the sea, is thought to be the most northern habitation of this plant, and until lately was supposed to be the only one in Massachusetts. It has recently been found at the distance of some miles, in another swamp, in the midst of deep woods in Essex.¹ From these situations it will soon be completely extirpated. The fragrant flowers and even the leaves are in such request, that, early in the flowering season, numbers of persons resort to the swamps in quest of them, and great quantities are annually carried to Salem and Boston for sale. The gatherers of the flowers are regardless of the preservation of the trees ; and in a single season I have noticed scores of them broken down and almost entirely destroyed.

Few ornamental plants are better worth the attention of the gardener. Carefully trained, it forms a beautiful little tree. The bark on the young shoots is smooth and of a rich apple-green, becoming afterwards of a soft glaucous or whitish color. Before opening, the leaves are enclosed by the stipules, which, falling, leave rings encircling the branch ; when young, the leaves are covered with a pubescence, which, beneath, has a silken lustre. They are entire, elliptical, or slightly obovate, on short, tapering petioles, and, when mature, smooth, and light green above, pale-glaucous beneath, and of a soft, leathery texture. The midrib is prominent beneath, for the whole length of the leaf. The calyx, of the solitary, terminal flowers, consists of three concave, obovate, membranaceous sepals, resembling petals, but less delicate in texture. The corolla has usually nine delicately white petals, tapering at base, and

¹ It is said to have been found, in a single spot, in the county of York, Maine.

rounded at the extremity, arranged in three circles, and mutually enfolding each other before expansion. The stamens are very numerous, eighty to one hundred or more, in spiral lines, on the conical, green torus or receptacle, — three or four of the outer ones often partly turned into petals. Anthers very long, yellow, pointed, set upon the inner side of the short filaments, and opening inwardly. Styles many, on a conical receptacle; stigmas long, yellow, turned back at the tip, and rising much above the ends of the long anthers. The fruit is a cone about two inches long, covered with scale-like, imbricated ovaries, from which, when mature, escape the scarlet, obovate seeds, which, instead of falling at once to the ground, remain some time suspended by a slender thread.

No plant is, at every season and in every condition, more beautiful. The flower, two or three inches broad, is as beautiful and almost as fragrant as the water lily. Like most other plants growing naturally in wet ground, it may easily be made to thrive in dry, but will not then continue long in flower. In moist situations, particularly if protected through the winter by a covering of boughs or mats, it continues to produce its flowers to the end of the warm season.

Like other plants of this genus, the Small Magnolia possesses valuable properties as a tonic and as a warm stimulant and diaphoretic; and it has been used with great success in chronic rheumatism, in intermittent fevers, and particularly in fever and ague. To secure the virtues of the plant, a tincture should be made of the bark or cones, while green, and before the volatile parts have escaped.¹

The small magnolia may be propagated by layers, which require two years to root sufficiently, and by seed. The seed should be preserved in moist bog earth, and sown very early in spring, in earth of the same kind.

¹ Bigelow, American Medical Botany, II., 71.



TULIP TREE. (*Liriodendron tulipifera.*)

XL. 2. THE TULIP TREE. *LIRIODÉNDRON*.

A genus of a single species, found only in North America. The calyx is of three sepals which fall at the same time with the petals; the lily-like, bell-shaped corolla, of six petals in two rows; the stamens are very numerous, as are the small, imbricated, one- or two-seeded, winged ovaries or seed-vessels.

THE TULIP TREE. *L. tulipifera*. L.

Figured in Catesby's Birds, Plate 48; Michaux, Sylva, II., Plate 61; Abbott's Insects of Georgia, II., Plate 102; Bigelow's Medical Botany, Plate 31; Audubon's Birds, I., Plate 12; and in our Plate.

The tulip tree is a tall, stately, upright tree, with a magnificent, columnar trunk and an open head, rounded above. It spreads little towards the root, but has large limbs, stretching strongly upwards, and throwing out branches at all angles. The bark of the trunk is of a dark ash color, with very numerous, small, superficial rugosities, though, when seen at a distance, it has a somewhat smoothish appearance. The recent shoots are of a bright brown or chestnut color, smooth, with a grayish bloom-like dust upon it, and distant, narrow dots. The older branches are brown, and seem as if covered with a transparent membrane.

The terminal bud is formed by the two stipules cohering by their edges, — into an oblong, rounded, purse-like sheath. On opening this, a minute leaf is found, bent down and folded together in a single fold, by the side of another, smaller sheath. When opening naturally, the stipules expand and protect the leaf till it attains its full size, when they are an inch or two long, of a yellowish-green color, oblong, broader towards the end, rounded, with a minute point. They then fall, leaving a slight annular scar above the base of the leaf.

The leaves are on long, angular footstalks, very large at base. They are four-lobed, the lobes ending in rounded or sharp points, and separated by broad, shallow sinuses. The terminal

lobes end abruptly, as if the extremity of the leaf had been cut off. In large leaves, each of the lobes is occasionally divided into two, and the lower ones sometimes into three or more partial lobes or large teeth. In some varieties, the points of the lobes are obtuse. The leaves are smooth, and of a light green above, glaucous or whitish beneath, with downy nerves, and finely reticulated veins.

The large, solitary flowers have the shape, size, and appearance of a lily. They are contained in a sheath of two triangular leaves, which are thrown off by the expansion of the flower. The sepals are of a greenish color, striate or veined and dotted, sub-coriaceous in texture, concave, and spreading, afterwards bending back. The petals are also striate or veined and dotted, of a greenish-yellow, somewhat fleshy in texture, and marked towards the base with a crescent-shaped spot of bright orange. In the centre is a large, conical, pointed pistil, surrounded by numerous stamens with long anthers.

The bark of the root and branches of the tulip tree is remarkable for its pungent, bitter, and aromatic taste, and agreeably aromatic odor, and acts on the system as a stimulating tonic, as a diaphoretic, and as a sudorific. It has been successfully employed in the treatment of chronic rheumatism and intermittent fever. The useful properties are most completely extracted by alcohol. — *Big. Med. Bot.*, II., 111.

The wood of the tulip tree, under the name of white wood, is extensively used in every part of the country. In the Western States, it supplies, in a great degree, the deficiency of pine, and is used by the joiner, as a substitute, in the inner wood work of houses. In New England, it is preferred to other kinds of wood in all uses which require great flexibility, as about stairs, for the wash-board in circular rooms, and for the panels of carriages; also for the bottom of drawers, and for panels in common wardrobes and other small articles. It is remarkably white, soft, smooth, fine-grained, and is very easily wrought and bent to any required shape. It comes

into Massachusetts from New York, usually in square-cornered boards three feet wide and twelve feet long.

Considerable numbers of this tree are found in several towns on Westfield River, particularly in Russell. It is also found native, very rarely, in the eastern part of the State.

The tulip tree is found abundantly in Canada West, and the Western States, where it sometimes reaches the height of one hundred and twenty or one hundred and forty feet, with a diameter of five or six. In New England, and along the Atlantic coast to Florida, it does not reach these ample dimensions, but is still a very noble tree. Michaux thinks that, next to the buttonwood, it attains, in favorable situations, in a deep, cool, moist soil, the largest size of any tree in the United States.

The tulip tree is readily propagated by seeds, which require a fine, soft mould, and a cool and shady situation. If sown in autumn, they come up the succeeding spring; but, if sown in spring, they often remain a year in the ground. Varieties are propagated by layers, or by budding or grafting. This tree, like the magnolias, has few fibres on its roots, and is, therefore, not readily transplanted. If sown on seed-beds, the end of the root, when transplanted, should be carefully cut off, with a sharp knife. This will lead it to throw out more fibres, and make it more secure for future transplanting.

SECOND GENERAL DIVISION.

CHAPTER VIII. MONOCOTYLEDONOUS PLANTS.

THIS division is of little comparative importance in extra-tropical regions. In this State, it is represented by a few families of humble plants, among which are, however, the grasses and those which produce the various kinds of corn and grain. The noblest of monocotyledonous plants, the palms, are confined to the warmer climates.

The stem of monocotyledonous plants is not composed of distinct pith, wood, and bark, the two latter arranged in concentric rings or zones and traversed by medullary rays, but of bundles of vessels and woody fibres traversing the stem somewhat irregularly from the base of the leaves to the roots, or to points near the surface of the stem. The leaves have ribs and veins nearly parallel, and are not usually articulated to the stem, but continuous; so that, when they wither and decay, they leave a ragged, indefinite, partial stalk, instead of the well-marked scar left by the fall of the leaf of a dicotyledonous plant. The parts of the flowers are in threes or multiples of three. The embryo of the seeds is undivided, and has a single lobe or cotyledon, and a single radicle.

FAMILY XLI. THE SMILAX FAMILY. *SMILACEÆ*.

R. BROWN.

This small family, the only one containing monocotyledonous plants which in our climate have woody stems, includes plants differing considerably in aspect, habits, and duration. To it belong the small, herbaceous annuals, *Trillium*, *Medèola*, *Streptòpus*, *Convallària*, and *Uvulària*, and the woody, climbing plants of the genus *Smilax*. It is found principally in Asia and North America. It is characterized by having the

calyx and corolla usually confounded, of six parts, resembling petals in being colored ; six stamens ; style trifid ; three stigmas, or a three-parted stigma, and the fruit a roundish berry.

The properties are various. Sarsaparilla, well known for its diuretic, demulcent, and diaphoretic powers, is the root of one or several species of *Smilax* ; and other species are known to have similar properties. Dr. Barton found the same in the root of *Meddola Virginica*. Some species of *Trillium*, remarkable for the threefold arrangements of its parts, — its three leaves, three sepals, three petals, twice three stamens, three-celled ovary, and three styles, — have nauseous berries and violently emetic roots. The large, fleshy roots of China *Smilax* are eaten in the Celestial Empire instead of rice, and supposed by the Abbé Rochon to contribute to the corpulency of the Chinese. A reddish powder is obtained by maceration in water from the roots of the same plant, and, with boiling water, forms a jelly, which, sweetened with honey or sugar, is used as an article of food, according to De Candolle, in the southern parts of North America.

THE GREEN BRIAR. *SMILAX*.

The different sexes on different plants. The flowers have a perianth of six parts. In the male flowers, the six stamens have their anthers laterally attached. The fertile flowers have a minute style, three stigmas, and produce a berry with three cells, and one to three seeds in each. They are often climbing, prickly plants ; sometimes herbaceous. The stem of the leaf has a tendril on each side. Flowers transient, in axillary umbels.

The genus contains nearly fifty species ; of which fourteen, according to Nuttall, belong to North America. Two are found in Massachusetts : —

The Round-leaved Green Briar, known by its climbing, round, thorny stem ; and

The Carrion Flower or Herbaceous Smilax, known by its angular, nodding, stem, and the intolerable smell of its flowers.

Sp. 1. ROUND-LEAVED SMILAX. GREEN BRIAR. *S.*
Rotundifolia. L.

Figured in Audubon's Birds, I., Plate 57; and in our Plate.

This is a beautiful, but very troublesome, vine, climbing, with a smooth, yellowish-green stem, from clump to clump, and from tree to tree, to the distance often of thirty or forty feet. The stem is woody, strong, very tough, flexuose, somewhat branched and smooth, except where armed with short, straight, rigid thorns which proceed from the wood. Branches somewhat four-angled. Leaves unarmed, orbicular, heart-shaped at base, five-nerved, ending in a short point, paler and glaucous beneath, two or three inches long, and of equal breadth, and reticulate in their structure. Footstalks short, margined, with a slender but tough tendril from the extremity of the margin on each side. The flowers, which appear in June, are small, yellowish-green, in roundish umbels, on short stalks, from the axils of the leaves. Berries small, bluish-black, with a glaucous bloom; disagreeable to the taste, ripening in October. The root is long and tough, and thickens sometimes into tubers. The Green Briar abounds in moist grounds, especially where the trees have been wholly or partially cut off. The leaves are of a beautiful soft green, which, in October, turn to a deep yellow, and, in November, to a rust color.

Sp. 2. CARRION FLOWER. HERBACEOUS SMILAX.
S. herbacea. L.

A smooth, erect or leaning, herbaceous plant, from a woody, perennial root. Stem three to eight feet long, smooth, unarmed, somewhat angled, often reddish, attaching itself to other plants by its thread-like tendrils; simple, or with a few



GREEN BRIAR. (*Smilax rotundifolia*.)

small branches. Stem leaves two or three inches long, and one or two wide, heart-shaped or somewhat acute at base, pointed, entire, seven- or nine-nerved, smooth above, downy on the nerves and veins beneath. Leaf-stalk half as long as the leaf, winged at base, with a slender tendril terminating each wing. Branches few, from the axils of the stem-leaves, bearing a few narrower and smaller, five-nerved leaves. Flowers appear in June, and are small, yellowish-green, in small, round umbels, and of a very offensive odor. The staminate flowers are on a short footstalk; the fertile ones, on stalks six or eight inches long, and succeeded by small, compressed, dark-blue berries. The odor of the flowers is fugacious, and does not adhere to the dried specimens.

INDEX.

NOTE. — The botanical names of species, not native, are in *italics*.

	Page		Page
Abies	92	Amelanchier	503
alba	96	botryapium	503
Canadensis	92	Canadensis	503
Douglasii		ovalis	504
nigra	99	AMENTACEÆ	129
ABIE'TINÆ	73	Amentaceous plants	129
Acer	548	American arbor vitæ	112
<i>campestre</i>	549	aspen	279
<i>circinatum</i>	549	beech	180
<i>dasycarpum</i>	556	chestnut	187
<i>laevigatum</i>	549	elm	322
<i>macrophyllum</i>	549	hazel	194
<i>opalus</i>	549	holly	385
<i>opulifolium</i>	549	hop hornbeam	201
<i>Pennsylvanicum</i>	566	hornbeam	198
<i>platanoides</i>	549	laurel	442
<i>pseudo-platanus</i>	549	mountain ash	499
<i>rubrum</i>	551	nettle tree	344
<i>saccharinum</i>	558	yew	127
<i>spicatum</i>	567	Ampelopsis quinquefolia	535
ACERA'CEÆ	548	AMYGDA'LEÆ	508
Acorn, as food	132	ANACARDIA'CEÆ	569
management of	176	ANDROMEDA Tribe	420
Æsculus Californica	547	Andrœmedia polifolia	420
<i>flava</i>	547	ANDROME'DEÆ	420
<i>glabra</i>	547	Antiãris	313
<i>hippocastanum</i>	546	APPLE Family	483
<i>parviflora</i>	547	Apple	498
<i>pavia</i>	547	AQUIFOLIA'CEÆ	384
Aetna chestnut tree	191	Arbor vitæ	112
Alder	247	Arctostaphylos uva ursi	431
black	389	Arrow wood	413
common	248	maple-leaved	414
single-berry black	390	ARTOC'ARPEÆ	313
speckled	251	Ash Tribe	374
Alder-leaved buckthorn	540	Ash	375
<i>Cléthra</i>	426	black	381
ALMOND Family	508	red	380
Alnus	247	white	376
<i>incana</i>	251	Aspen	279
<i>serrulata</i>	248	Austrian pine	91
Alternate-leaved cornel	463	Autumn colors	11

	Page		Page
Azalea	438	Black currant	475
nudiflora	440	hazel	204
Póntica	434	mulberry	314
viscosa	438	oak	160
Balm of Gilead poplar	281	spruce	96
Balsam fir	101	swamp huckleberry	454
Banyan tree	313	walnut	211
BARBERRY Family	594	willow	307
common	595	whortleberry	451
Bark of the oaks	137	Blackberry	488
Barks for tanning	20	Bladder nut	543
Bark, structure of	47	Bland's grape	533
Bass wood	584	Blueberry, low	456
Bayberry	256	Blue huckleberry	455
Beach plum	510	Bog willow	296
Beaked hazel	196	Borers on the Pines	68
willow	302	Boxberry	429
BEAN Family	520	Box elder	568
Bear berry	431	BRAMBLE Tribe	487
oak	170	BREAD-FRUIT Family	313
Beauty of the forests	8	Bremontier's restoration of desert lands	87
Bedford willow	306	Broad-leaved Ledum	447
Beech	180	<i>Broussonetia papyrifera</i>	316
copper	186	Browsing of cattle hurtful to trees	37
European	185	Buckeye	547
mast	182	Buckthorn	538
of Europe	185	BUCKTHORN Family	538
purple	186	Buffon's mode of felling	41
Bénzoin odoriferum	865	Bullace plum	510
BERBERIDACEÆ	594	Bunch berry	469
Berberis vulgaris	595	Bush honeysuckle	406
Bétula	230	huckleberry	453
alba	243	Butternut tree	207
excelsa	235	Button bush	394
glandulosa	247	Buttonwood tree	261
lenta	232		
nigra	237	CACTACEÆ	480
papyracea	239	CACTUS Family	480
populifolia	243	<i>Camphora officinalis</i>	358
BETULACEÆ	229	Canada Judas tree	529
Bignonia	461	moonseed	600
BIGNONIA'CEÆ	461	plum	511
BIRCH Family	229	Rhodora	441
Birch	230	Canoe birch	239
bark	241	CAPRIFOLIA'CEÆ	398
black	232	CARPINA'CEÆ	198
canoe	239	Carpinus Americana	198
dwarf	247	Carrión flower	610
planting with	245	Carya	213
red	237	alba	217
sweet	232	amara	226
white	243	porcina	224
yellow	235	tomentosa	222
Birch canoes	241	Cashew nut	499
Bird's eye maple	555	Cassandra calyculata	423
Bitternut hickory	226	Castagno di cento cavalli	191
Black alder	380	Castanea	186
ash	381	vesca, var. Americana	187
birch	232	Catawba grape	533
cherry	515	Causes of the color of leaves	552

	Page		Page
Ceanòthus Americana	541	Common witch hazel	472
Cedar	112, 114	Comptònia	257
red	118	asprenifolia	258
white	114	CON'IFERE	58
Cedar apples	123	Continuation of the Forests	20
Cedar of Lebanon	111	Copper beech	184
Cedrus Libani	111	Cordate willows	299
CELASTRA'CEE	543	Corema	369
Celástrus scandens	545	Cork oak	137
Celtis	344	CORNA'CEE	462
Australis	346	Cornel	462
crassifolia	347	alternate-leaved	463
occidentalis	344	dwarf	469
Cephalánthus occidentalis	394	panicled	465
Cérasus Pennsylvànica	513	red-stemmed	465
pumila	515	round-leaved	464
serótina	515	silky	466
Virginiana	518	CORNUS Family	462
Cercis Canadensis	529	alternifolia	463
Chequer berry	430	Canadensis	469
Cherry	513	circinata	464
black	515	florida	467
choke	518	paniculata	465
northern red	513	sericea	466
sand	515	stolonifera	465
wild black	515	Córylus	194
Chestnut	86	Americana	194
dwarf	193	rostrata	196
improving by cultivation	189	Cotton tree	285
of Mount Ætna	191	Cow berry	457
Chestnut oak	154	Crack willow	304
Chicken grape	534	Cranberry	458
Chiógenes	460	high	415
hispídula	460	tree	415
Choke berry	502	Crata'gus	489
cherry	518	coccinea	493
Cinnamómun zeylánicum	358	crus-galli	492
CINNAMON Family	358	punctata	495
Clamoun	443	tomentosa	494
Clethra alnifolia	426	Creeper	535
Climbing staff tree	545	Creeping Mitchella	397
Cluster pine	91	Cross section of an oak	45
Clustered Zenobia	425	CROWBERRY Family	369
Cócclus 'Indicus	599	Cucumber tree	502
palmatus	599	Cupréssus	114
Cockspur thorn	492	disticha	60
Coffee	392	thuyoides	114
Coffee tree, Kentucky	529	CUPUL'FERE	129
Colors of leaves	11, 552	CURRENT Family	475
Columbo root	599	black	475
Common alder	248	large-flowering	478
American rose bay	433	Missouri	475
barberry	595	mountain	479
bear berry	431	red	475
buckthorn	539	Cydonia	506
cranberry	458	Cypress Tribe	111
elder	409	Cypress	114-117
European Elm	386		
grape	531	Dangle berry	452
locust tree	523	Decandolle on planting land	86
wild gooseberry	476	Deer berry	453

	Page		Page
Description of the flower and fruit	38-50	Fencing, materials for	24
DICOTYLEDONOUS plants	45	Fern, sweet	258
Diervilla trifida	406	Fever bark	601
Dirca palustris	367	bush	365
Distribution into families and genera	50	root	400
Division into families	52	Ficus religiosa	313
Division into genera	55	Field maple	549
Dogwood	575	Fir	101
flowering	467	balsam	101
Dotted-fruited thorn	495	double	104
Double balsam fir	104	Flower	50
spruce	96	Flowering of the poplar	285
Douglas's spruce	104	dogwood	467
Dr. Johnson's willow	306	raspberry	487
Dryadeæ	487	Fly honeysuckle	405
Dutch myrtle	255	hairy	402
Dwarf birch	247	Forests	1
Cassandra	423	beauty of	8
cornel	469	continuation of	20
chestnut	193	destruction of	17
gray willow	293	Dr. Piper on	7
rose bay	435	felling	31
sumach	574	for shade	13
Early fox grape	432	form a soil	36
white grape	432	fuel	18-23
wild rose	488	healthfulness of	14
ELDER Family	407	improvement	20-28
Elder	408	Marsh on the	6, 7
common	409	materials from the	21
panicled	408	on the climate	3
ELM Family	319	pruning	29
Elm	320	restoration	25
American	322	sea breezes on	38
English	336	stripping	41
Scotch	343	succession of	35
slippery	334	thinning of	27
twisted	340	uses of	3, 21
white	322	variety of	12
Elsinburg grape	533	waste of	17
EMPETRA'CEÆ	369	Fox grape	531
Epigæ'a repens	428	Fragrant sumach	579
ERICA'CEÆ	419	Fraser's pine	104
Euonymus	543	FRAX'INEÆ	374
European cranberry	459	Fraxinus	375
larch	107	acuminata	376
larch, planting with	107	excelsior	383
lime tree	583	pubescens	380
mountain ash	499	sambucifolia	381
silver fir	104	Frost grape	533
Fagus	180	Fuel from the forests	18, 83
sylvatica, var. Americana	180	Furniture, woods for	24
sylvestris	180	GALE'GEÆ	522
Families	50	Gale, sweet	253
Felling trees, best modes of	30	Gallnut	133
Buffon's mode of	41	Gaultheria	429
for timber	31	procumbens	430
seasons for	34	Gaylussacia	450
Fence of white cedar	121	dumosa	453
		frondosa	452
		resinosa	451

	Page		Page
Gigantic pine	91	Hickories, insects on	205
Glaucous kalmia	448	Hickory	213
<i>Gleditsia triacanthus</i>	529	bitternut	221
Golden osier	303	mockernut	222
-twigged lime tree	584	pignut	224
Gooseberry, common	475	shell bark	217
common wild	476	High blackberry	487
prickly	476	bush huckleberry	454
rounded-leaved	477	cranberry	415
swamp	478	raspberry	487
Grape, Bland's	533	HIPPOCASTANA'CEÆ	546
Catawba	533	Hobble bush	417
chicken	534	HOLLY Family	384
common	531	Holly	384
early fox	532	mountain	387
early white	532	wild	387
Elsinburg	533	HONEYSUCKLE Family	398
fox	533	Honeysuckle	402
frost	533	bush	406
Isabella	533	fly	405
late fox	533	hairy	402
river	535	small-flowered yellow	403
Schuylkill	533	Hop hornbeam	201
summer	533	HORNBEAM Family	198
summer white	532	Hornbeam	198
sweet-scented	535	Horn pine	353
Grape vine	530	Horse chestnut	546
winter	533	Huckleberry	451
Gray birch	243	Hudsônia	592
Great maple	549	downy	592
Green briar	609	ericoides	593
GROSSULA'CEÆ	475	heath-like	593
Ground hemlock	127	tomentosa	592
laurel	428	Ilex opaca	385
Grouping of the oaks	172	Implements, materials for	24
Guelder rose	410	Improvable lands	26
Guelder-leaved maple	549	Improvements of forests	20
Gymnocladus Canadensis	529	Indian cedar	204
Hackberry	347	Indian fig	313, 481
Hacmatack	105	Indian poke, a remedy for poison	505
Hairy fly honeysuckle	405	Ink berry	391
honeysuckle	402	Insects injurious to cherry trees	509
Hallam on forests	12	elms	321
HAMAMELA'CEÆ	471	hickories	205
Hamamelis Virginiana	472	locust tree	522
Hard-hack	484, 486	maples	549
Hard maple	558	oaks	133
Hazel	194	pines	67
American	194	plum trees	509
beaked	196	poplars	277
European	197	sassafras	361
Heart-leaved willow	299	willows	291
HEATH Family	419	Ipecac	393
Heavy pine	91	Iron wood	203
Hedge of red cedar	121	Isabella grape	533
Helianthemum Canadense	590	Italian maple	548
ramuliflorum	591	Ivy, poison	577
Hemlock	92	Japan honeysuckle	404
ground	127	Jersey tea	541
Herbaceous Smilax	610		

	Page		Page
Judas tree, Canada	529	Low blackberry	488
JUGLANDACEÆ	205	blueberry	486
Juglans	206	raspberry	487
cinerea	207	Lyônia paniculata	424
nigra	211		
June berry	503	Maclura aurantiaca	316
Juniper	118-124	tinctoria	317
Juniperus	118	MADDER Family	392
communis	124	MAGNOLIA Family	601
Virginiana	118	Magnolia	602
		acuminata	602
Kalmia	442	auriculata	602
angustifolia	445	glauca	603
glauca	446	heart-leaved	602
latifolia	443	purple	602
Kentucky coffee tree	529	small	602
		three-petalled	602
Labrador tea	447	yulan	602
Landscape maple	555	MAPLE Family	548
Larch	105	Maple	548
European	107	bird's eye	555
planting with	108	blistered	555
Large-flowering currant	478	curled hard	555
-leaved maple	549	field	549
pinweed	591	great	549
poplar	278	guelder-rose-leaved	549
Larix Americana	105	hard	558
Late fox grape	533	Italian	549
LAURINEÆ	358	landscape	555
Laurus nobilis	358	large-leaved	549
Leather wood	367	Montpelier	549
Leaves, colors of	11, 358	mountain	567
Lechea	591	Norway	549
major	591	red	551
minor	592	rock	558
thymifolia	591	round-leaved	549
Lêdum	447	scarlet	551
latifolium	447	soft	551
LEGUMINOSEÆ	520	smooth-leaved of Nepaul	549
Lever wood	203	striped	566
Ligustrum vulgare	373	sugar	558
LILAC Tribe	374	swamp	551
Lilac	374	Tartarean	546
Lime tree	584	white	556
golden-twiggèd	584	Maple-leaved arrow wood	414
LINDEN Family	582	Maple sugar	18
tree	584	Maple sugar making	560
Linnaea borealis	399	value of	562
Liquidamber	257	Marking-nut tree	569
Liquidamber styraciflua	351	Marsh	25, 88
Liriodendron tulipifera	605	Marsh on forests	1, 6, 7, 15, 20, 37
Little chinquin oak	158	Massachusetts forests to be im-	
Locust tree	522	proved	43
Long-leaved cucumber tree	601	Materials for the arts	15
Lonicera caerulea	405	ship-building	16
ciliata	405	Mayflower	428
flava	403	Meadowsweet	485
hirsuta	402	Mélanorrhæa usitatissima	569
parviflora	403	MENISPERMACEÆ	599
LOTEÆ	522	Menispermum Canadense	600
Lotus	346	MEZE'REUM Family	367

	Page		Page
Milne on planting	175	Oak, scarlet	163
Missouri currant	475	sessile-fruited	178
Mitchella repens	397	species of	144
Mockernut hickory	222	stalk-fruited	178
Monocotyledonous plants	603	swamp white	153
Monopetalous plants	371	velani	137
Montpelier maple	549	white	145
MOONSEED Family	599	yellow-barked	161
Moosewood	566	Oaks, arrangement of	144
Morus	314	depth of roots	138
<i>alba</i>	315	growth of	140
<i>multicaulis</i>	316	grouping of	172
<i>nigra</i>	315	natural arrangement	172
<i>rubra</i>	314	number of species	144
Mountain currant	479	planting with	173
ash	489	vitality of	141
European	501	Occidental plane	261
holly	387	Ohio buckeye	547
laurel	443	Oilnut tree	207
maple	567	OLEA'CEÆ	371
partridge berry	460	OLEI'NEÆ	372
sumach	574	OLIVE Family	371
Mulberry	314	Tribe	372
Mulberry, paper	316	Opuntia <i>coccinifera</i>	480
MYRICA'CEÆ	252	<i>vulgaris</i>	481
Myrica <i>cerifera</i>	254	Oriental plane	269
gale	255	Orme tortillard	340
Myrtle	254	Osage orange	316
Dutch	255	Osier, golden	303
Naked viburnum	411	Ostrya <i>Virginica</i>	201
Narrow-leaved kalmia	445	Overcup white oak	149
Necklace poplar	287	Oxycoccus <i>macrocarpus</i>	458
Negundo	568	<i>palustris</i>	459
Nemopanthus <i>Canadensis</i>	387	Pale laurel	446
Nettle tree	343	Palo di vacca	313
New Jersey tea	541	Panicked cornel	465
Nine bark	484	elder	408
Northern red cherry	413	Lyonia	424
Norway pine	89	Pannage	133
spruce	104	Paper mulberry	316
Nyssa <i>multiflora</i>	353	PAPILIONA'CEÆ	522
Oakësia	369	Partridge berry	396, 430
Cónradi	369	mountain	460
OAK Family	129	Pear	489
Oak	131	prickly	481
bear	170	Pear tree	496
black	160	Pear leaved thorn	404
chestnut	155	Pepperidge	353
chincapin	158	<i>Persea gratissima</i>	358
cork	137	Peruvian bark	392
English	178	Picea <i>balsamifera</i>	101
little chincapin	158	<i>Fraseri</i>	104
over-cup white	149	Pignut hickory	224
pin	167	PINE Family	58-73
post	151	Pine	73
rate of growth	140	Austrian	91
red	168	cluster	91
rock-chestnut	156	Fraser's	104
rough	151	gigantic	91
		heavy	91

	Page		Page
Pine, Norway	89	Populus, lævigata	283
pitch	79	monilifera	287
red	89	trémulifórmis	279
Sabine's	91	PRICKLY ASH Family	580
Scotch	91	Prickly ash	581
uses of	77	gooseberry	476
white	73	pear	461
Pinus	73	Prim	373.
<i>Austriaca</i>	91	Prinos	388
<i>Lambertiana</i>	91	glaber	391
<i>maritima</i>	87	lævigatus	345 390
<i>pinaster</i>	91	verticillatus	389
<i>ponderosa</i>	91	Prinos-like willow	296
<i>resinosa</i>	89	Privet	373
<i>rigida</i>	79	Products of the pines	59
<i>Sabiniana</i>	91	Pruning	29
<i>strobus</i>	73	Prunus	509, 513
<i>sylvestris</i>	91	<i>Americana</i>	511
Pine and Fir Tribe	58-73	<i>domestica</i>	510
Pinweed	591	<i>instituta</i>	512
Piper, Dr. R. U.	7, 8, 9	<i>maritima</i>	510
<i>Pistacia lentiscus</i>	569	<i>spinosa</i>	510
<i>terebinthus</i>	569	Purple beech	184
Pitch pine	79	magnolia	602
PLANE TREE Family	260	Pursh's willow	309
Plane tree	260	Pyrus	406
Planer tree	350	<i>Americana</i>	499
<i>Planera Richardi</i>	351	<i>angustifolia</i>	499
<i>ulmifolia</i>	350	<i>arbutifolia</i>	502
Planting near the sea	38	<i>aucuparia</i>	500
with birch	245	<i>communis</i>	496
with larch	107	<i>coronaria</i>	499
with oaks	173	<i>malus</i>	498
with pines	70	<i>melanocarpa</i>	503
with pitch pine	84	<i>serotina</i>	515
Plants with naked seeds	58	<i>sorbus</i>	501
PLATANACEÆ	260	Queen of the meadows	485
<i>Platanus occidentalis</i>	261	Quercus	131
<i>orientalis</i>	269	<i>alba</i>	145
<i>racemosa</i>	271	<i>bicolor</i>	153
Plum, beach	510	<i>castanea</i>	155
bullace	512	<i>chinicapin</i>	158
Canada	511	<i>coccifera</i>	134
yellow	511	<i>coccinea</i>	163
Plum tree	509	<i>ilicifolia</i>	170
Plymouth crowberry	369	<i>infectoria</i>	134
<i>Podisoma macrocarpus</i>	124	<i>macrocarpa</i>	149
Poison ivy	577	<i>montana</i>	156
sumach	575	<i>obtusifolia</i>	151
wood	575	<i>palustris</i>	167
POMACEÆ	489	<i>pedunculata</i>	178
Poplar	276	<i>pinus</i>	155
balm of Gilead	281	<i>rubra</i>	168
flowering of the	285	<i>sessiliflora</i>	178
insects on	277	<i>stellata</i>	151
large	278	<i>suber</i>	137
necklace	287	<i>tinctoria</i>	159
river	283	Quince tree	499, 506
Pópulus	276	Racemed elm	343
<i>candicans</i>	281		
<i>grandidentata</i>	278		

	Page		Page
Raspberry, bristly	487	Ribes, <i>rubrum</i>	475
flowering	487	<i>speciosum</i>	475
high	487	<u>uva crispa</u>	475
low	487	River bush	394
red	487	elm	342
Red ash	380	grape	535
birch	237	poplar	283
bud	529	Roan tree	501
cedar	118	Robinia	522
currant	575	<i>hispida</i>	523
maple	557	<i>pseudacacia</i>	523
mulberry	314	<i>viscosa</i>	523
oak	160	Rock chestnut oak	154
pine	89	Rock maple	558
raspberry	487	Rock Rose Family	589
Red-stemmed cornel	465	ROSA'CEÆ	483
Representation of trees	44	Rosa Carolina	488
RHAMNA'CEÆ	538	<i>lucida</i>	488
Rhamnus alnifolius	540	<i>nitida</i>	488
<i>catharticus</i>	539	<i>rubiginosa</i>	488
Rhododéndron	433	Ro'sEÆ	488
<i>arldreum</i>	433	Rose bay	433
<i>campanulatum</i>	434	dwarf	435
<i>chrysanthum</i>	434	Rose Family	483
<i>ferrugineum</i>	433	Tribe	485
<i>glaucum</i>	439	Rough oak	137
<i>Indicum</i>	434	Round-leaved cornel	464
maximum	434, 435	gooseberry	477
<i>nudiflorum</i>	440	green briar	510
<i>Ponticum</i>	433	maple	549
<i>punctatum</i>	434	smilax	610
<i>punicum</i>	434	Rowan tree	489
<i>purpureum</i>	434	RUBIA'CEÆ	392
<i>rhoddra</i>	433	Rubus	487
<i>viscosum</i>	438	<i>Canadensis</i>	488
Rhoddra	440	<i>frondosus</i>	487
<i>Canadensis</i>	441	<i>hispidus</i>	488
RHODRA' Tribe	433	<i>occidentalis</i>	488
RHODO'REÆ	433	<i>odoratus</i>	487
Rhus	570	<i>sempervirens</i>	488
<i>aromatica</i>	579	<i>setosus</i>	488
<i>copallina</i>	574	<i>strigosus</i>	487
<i>coriaria</i>	570	<i>villosus</i>	487
<i>cotinus</i>	570	Sabine's pine	91
<i>glabra</i>	572	Sage willow	293
<i>radicans</i>	577	SALICES ALBÆ	303
<i>toxicodéndron</i>	577	CINE'REÆ	293
<i>typhina</i>	571, 564	CORDATÆ	299
<i>venenata</i>	575	DISCOLO'RES	296
<i>vernicefera</i>	570, 575	FRAGILES	304
Ribes	475	SALICI'NEÆ	274
<i>aureum</i>	475	Salix	289
<i>cynobati</i>	476	<i>alba</i>	303
<i>floridum</i>	478	<i>Babylonica</i>	311
<i>glaucum</i>	439	<i>cærulea</i>	303
<i>grossularia</i>	475	<i>cordata</i>	299
<i>hirtellum</i>	475	<i>crassa</i>	296
<i>lactistre</i>	478	<i>decepiens</i>	304
<i>nigrum</i>	475	<i>discolor</i>	296
<i>prostratum</i>	479	<i>eriocéphala</i>	296
<i>rotundifolium</i>	477		

	Page		Page
Salix, falcata	307	Smooth sumach	572
<i>fragilis</i>	304	Snag tree	353
grisea	298	Soft maple	551
humilis	294	Soil for pines	69
lucida	310	Sowing seed of pine	70
myricoides	300	Species of oak	144
nigra	307	Speckled alder	251
prinoides	296	Spice bush	365
Purshiana	307	Spindle tree	543
recurvata	295	SPIRÆA Tribe	484
rigida	300	<i>Spiræa opulifolia</i>	484
rostrata	302	<i>paniculata</i>	486
<i>Russelliana</i>	306	<i>salicifolia</i>	485
sericea	298	<i>tomentosa</i>	486
Torreyana	299	Spoonwood	443
triandra	308	Sporidochia	123
tristis	293	Spruce	92
<i>vitellina</i>	303	black	96
Sallows	293	double	96
Sambucus Canadensis	409	Douglass's	104
pubens	408	single	99
Sand cherry	515	white	99
SANDAL WOOD Family	352	STAFF TREE Family	543
SANTALACEÆ	352	Staff tree	545
Sassafras	359	Stag's horn sumach	571
officinale	350	Staphylæa trifolia	544
Savin	121	Steeple bush	486
Scarlet-fruited thorn	493	Striped maple	566
honeysuckle	402	Strength of wood	39
maple	551	Study of trees	42
oak	163	Stumps, shoots from	33
Schuykill grape	533	Succession of forests	35
Scotch elm	343	Sugar maple	558
pine	91	pear wild	503
Sea breezes on forests	38	SUMACH Family	569
Season for felling trees	31	Sumach	570
Semecarpus anacardium	569	fragrant	579
Sequoia	66	smooth	572
Service tree	501	stag's horn	571
Sessile-fruited oak	178	tanner's	570
Shad bush	503	varnish	570
Shade of trees	13	Venetian	570
Shell-bark hickory	217	Summer grape	533
Shining rose	488	white grape	532
Ship-building, trees for	23	Sun rose	590
Shoots from stumps	33	Canada	590
Silky cornel	466	Swamp gooseberry	478
Silver fir	104	laurel	603
Single-berry black alder	390	maple	551
Single spruce	99	pink	438
Slippery elm	384	pyrus	503
Sloe thorn	512	rose	488
Small-flowered yellow honeysuckle	403	sugar pear	504
Small magnolia	603	whortleberry	454
pinweed	922	white oak	153
SMILACEÆ	608	Sweet birch	232
SMILAX Family	608	briar	483
herbacea	610	buckeye	480
Smilax rotundifolia	510	fern	258
Smoke tree	570	gale	255
Smooth-leaved maple of Nepal	549	-scented grape	535

	Page		Page
Sweet viburnum	412	Vaccinium, <i>myrtillus</i>	450
wood	358	Pennsylvanicum	456
Sycamore	265	staminum	453
<i>Syringa vulgaris</i>	374	<i>uliginosum</i>	450
		<i>vacillans</i>	455
Tanning, barks for	25	<i>virgatum</i>	455
Tanner's sumach	570	<i>vitis idæa</i>	457
Tartarean maple	549	Variety of forest trees	9, 17
TAXACEÆ	126	Varnish sumach	570
Taxodium	117	Varnished willow	306
<i>distichum</i>	117	Velani oak	137
Taxus	126	Venetian sumach	570
Canadensis	127	Veratrum viride, a remedy for poison	505
Tecoma	461	VIBURNEÆ	407
Theet-see	569	Viburnum	410
Thimbleberry	488	acerfolium	414
Thinning forests	29	dentatum	413
Thorn	489	lantanoides	417
cockspur	492	lentago	413
dotted-fruited	495	nudum	411
pear-leaved	494	opulus	415
scarlet-fruited	493	sweet	412
sloe	510	VINE Family	530
white	493	Virginian creeper	535
Three-flowered bush honeysuckle	406	VITACEÆ	530
leaved bladder nut	544	Vitis æstivalis	533
THYMELACEÆ	367	cordifolia	534
Thyme-leaved pinweed	591	labrusca	531
Thuya occidentalis	112	riparia	535
Tilia Americana	584	sinuata	533
TILIAACEÆ	582		
Torrey's willow	299	WALNUT Family	205
Transplanting of evergreens	73	Walnut	206
Trees, an element of beauty	9	black	211
for sandy barrens	60	Waste of the forests	17
period of decay	35	Water andromeda	420
Triosteum perfoliatum	401	WAX MYRTLE Family	254
TRUMPET-FLOWER Family	461	Wax myrtle	256
Trumpet Honeysuckle	402	Waxwork	545
Tselkwa	351	Wayfaring tree	417
Tulip tree	605	Weeping beech	186
Tupelo tree	353	willow	311
Twin flower	399	White ash	376
		birch	243
ULMACEÆ	319	cedar	114
Ulmus	320	elm	322
Americana	322	maple	556
campéstris	336	mulberry	315
fulva	334	oak	145
montana	342	pine	73
nemorialis	342	spruce	99
racemosa	343	thorn	493
Upas tree	313	willow	303
Upright honeysuckle	440	WHORTLEBERRY Family	449
Uses of forests	3	Whortleberry	450
Uva crispa	475	black	451
ursi	431	black swamp	455
		blue	455
VACCINEÆ	449	bog	450
Vaccinium corybosum	454	bush	453
disomorphum	455	high bush	454

	Page		Page
Whortleberry, swamp	454	Willow, yellow	303
Wild black cherry	515	insects on	291
bullace tree	512	WILLOWS, cordate	299
holly	387	sallows	293
honeysuckle	438	two-colored	296
sugar pear	503	white	303
WILLOW Family	274	yellow	303
Willow	289	Winter berry	388
beaked	302	grape	534
<i>Bedford</i>	306	WITCH HAZEL family	471
black	307	Withe rod	411
bog	296	Wood of pines	62
crack	304	Wyman, Jeffrey	124
dwarf gray	293		
glaucous	296	XANTHOXYLA'CEÆ	580
glossy	310	Xanthóxylum Americànum	581
golden osier	303		
heart-leaved	299	Yellow-barked oak	159
low bush	294	birch	235
prinos-like	296	plum	511
Pursh's	307	willow	302
sage	293	wood	581
silky headed	296	Yew	127
silky-leaved	298	Yews	126
Torrey's	299	Yulan magnolia	602
two-colored	296		
varnished	306	Zelkoua	351
weeping	311	Zenòbia raceòmsa	425

Boston Public Library
Central Library, Copley Square

Division of
Reference and Research Services

The Date Due Card in the pocket indicates the date on or before which this book should be returned to the Library.

Please do not remove cards from this pocket.

E. P. L. Bindery
SEP 12 1912

THE PUBLIC
OF THE
CITY OF BOSTON

From No. 122